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A SHORT SURVEY
OF
THE DANISH AGRICULTURE

PREPARED BY
PROFESSIONAL EXPERTS
AND PUBLISHED BY
THE ROYAL DANISH
AGRICULTURAL SOCIETY

COPENHAGEN
PRINTED BY NIELSEN & LYDICHE
(AXEL SIMMELKIÆR)
1913

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M. W.

Preface.

This booklet is prepared for the foreigners who visit Denmark in order to make themselves familiar with Danish agriculture. It presents, in a highly condensed form, the most important information about agriculture, forestry and horticulture, as well as the conditions under which the agricultural industries work. The foreigners who desire more detailed information will have to seek it elsewhere and may secure assistance in doing this by applying in advance (stating the special lines to be investigated and proposed time of arrival and time available) to the agricultural tourist's bureau, Vestre Boulevard 34, Copenhagen B. (Office hours from 2 to 4 pm.).

The agricultural society has received a subsidy for the publication of a former German edition as well as this one, from the Julius Skrike's foundation, for which aid the society hereby offers it's sincere gratitude.

June 1913.

The Royal Danish Agricultural Society.

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The Climate.

The Climate of Denmark is islandic with comparatively mild winters and cool summers. The annual normal temperature in the different parts of the country is between 6°.5 C. and 8° C., that in winter between — 0°.5 C. and + 1° C., that of spring between 4°.5 C. and 6° C., that of summer between 14°.5 C. and 16° C. and that of autumn between 7° C. and 9° C.; it is generally coldest in the central and northern part of Jutland and warmest on Lolland, Falster and the islands south of Fyn. The normal temperature (average for the whole country) is — 0°.2 C. for January, 5°.2 C. for April, 16° C. for July and 7°.9 C. for October. The monthly mean temperature is — like the other meteorological elements — very variable in the different years, thus it has varied during the period 1874 to 1910 for January between — 5°.8 C. and + 3°.7 C and for July between 13°.7 C. and 18°.6 C. The absolute highest temperature observed in Denmark is 35°.8 C. and the absolute lowest — 29°.6 C. The annual number of frost days is, on an average, about 125 in central Jutland and 80 to 95 on Lolland, Falster and the islands south of Fyn. The last frost in the spring happens in central Jutland on an average about May 10th, in central Fyn and Seeland about May 1st and on Lolland and Falster about April 20th. In the autumn the frost commences in central Jutland averagely ca. October 5th, on Lolland Falster ca. November 1st. — The wind blows most frequently from southwest and west, only in the spring are the easterly winds as frequent as the western, in April they even predominate. The mean velocity of the wind is 7.5 $\frac{m}{sec}$ (meter per second) in winter and 6 $\frac{m}{sec}$ in summer. The mean annual precipitation is 615 mm, of this 195 mm falls in summer, 185 mm in the autumn, 120 mm in winter and 115 mm in the spring. It is largest (715 mm) in southern Jutland and decreases towards the east; Seeland has 560 mm annually. The precipitation is very variable in the different years; since 1874 it has varied between 494 mm and 739 mm annually while the summer precipitation varied from 83 mm to 304 mm.

The number of days with precipitation is, on an average 158 annually of which 29 are with snow; the autumn, has 45, the winter 40, the spring 35 and the summer 38 days with precipitation; of the total number of days only 25% have more than 5 mm precipitation.

The mean relative humidity of the air is about 90% in winter and about 75% in summer. The amount of clouds is greatest in winter, when, on an average, 73% of the sky is overcast, whilst in summer it is only 53%.

Literature:

Hoffmeyer: Klima og Vejrforhold, København 1883.

V. Willaume-Jantzen: Vindforholdene etc. ved Jyllands Vestkyst, København 1887.

— — Meteorologiske Observationer i København, København 1896.

H. O. G. Ellinger: Vindforhold i Danmark 1874—1893, København 1896.

A. Paulsen: Climate of Denmark, Intern. Meteorol. Congress, Chicago 1896.

An extensive work »Danmarks Klima«, is now being prepared.

The Soils of Denmark.

Almost everywhere in Denmark, clay, sand or gravel deposited during or after the glacial period is found below the mould. Soil originating from disintegration of rocks is, so to speak, not found.

Bornholm is different from the other parts of the kingdom. In the north of this island granite is found which in the south is overlaid by Cambrian and Silurian sandstones, shales and limestones. Kaoline, formed by disintegration of the granite, occurs east of Rønne. A small zone on the southern part of the west-coast and the western part of the south coast is occupied by the Jurassic (chiefly sands and clays of which some are fairly fireproof) and Cretaceous systems (green sand, marl and argillaceous limestones).

In the other parts of Denmark, the Cretaceous system is the oldest which is known. A deposit of chalk, hundreds of meters thick, supports the younger formations and is the direct underlayer of the drift in two larger territories one of which comprises Vendsyssel and the most easterly Jutland between Limfiorden and Mariagerfiord, and the other most of

Lolland, Falster, Møen and the most southerly Seeland. The Danian Forminifera-limestone (Blegekridt), Bryozoa-limestone (Limsten), Coral-limestone (Faxekalk) and »Saltholm«-limestone form the underlayer of the drift in Jutland in a belt stretching from Hanherrederne and North-Thy across Himmerland to the northern Djursland, in Fyn in the vicinity of Nyborg, in North-Langeland, in North-Seeland, and in a belt in South-Seeland from Stevns to the vicinity of Skelskør. The Cretaceous rocks are used in agriculture as a fertilizing lime.

The Tertiary system is the underlayer of the drift in the remainder of Denmark. Kerteminde-clay occupies large areas in Central-Seeland and in North-Fyn. Diatom-clay (Moler) occurs in several smaller districts near Løgstør- and Thisted-Bredninger. Plastic clay is found in the vicinity of Kallundborg and on Samsø, on the southern coast of Lolland, South-Langeland and Ærø, in South- and West- Fyn as well as on the east coast of Jutland from the Lesser-Belt to the southern Djursland and stretches from there into the country in a narrow zone past Randers through Hobro to Skive. Mica-clay and Mica-sand occupy the greatest part of Central- and West-Jutland.

Boulder clay is the most important of the glacial deposits as it forms the soil in the most fertile districts of the kingdom. It is a stony clay which — as a rule — is mixed with so much sand that the fine clay only forms one third of the whole mass. When not weathered it usually contains 10% to 30% carbonate of lime and about 0.08% phosphoric acid. It is used extensively as marl. It forms by far the greatest part of the soil in the Danish islands, in a belt along the east coast of Jutland from the frontier to Limfiorden, and in considerable areas around the western parts of this arm of the sea.

Moraine-sand — stony sand with very little clay — forms, as a rule, the soil in a zone which stretches from the frontier northwards through Central-Jutland into Vendsyssel, and on the »hill-islands« in West-Jutland. On the islands the moraine-sand plays but a small role. As the moraine-sand only contains a small amount of plantfeed and as water easily soaks through it, it is far more barren than the moraine clay.

Stratified gravel, sand or clay is very often found above, below or between the moraines; they have been deposited by water, as a rule, by that which arose from the melting inland ice, in front of the ice edge or beneath the margin of the ice. Where stratified sand or gravel occurs in the eastern part of the country, it is generally covered with boulder clay; in the western part it forms not only the large barren outwash plains, but also frequently appears in the surface of the hills. The stratified clay is found in numerous smaller areas round about the country. It is an excellent brickyard clay and is also used as marl.

Of the post glacial soils marine deposits cover large areas in Jutland north of Limfiorden and along the eastern coast between Limfiorden and Randersfiord, in North-Seeland and Odsherred as well as in North-Fyn. Where they consist of clay or mud, they are fertile, while sand and gravel form barren land. — Dunes cover about 500 sq. Km. on the west coast of Jutland and form a nearly continuous belt from Skagen to Fanø.

Moors and swamps cover about 1250 sq. Km. of Denmark. More than half of this area is peat bogs in which peat is cut and used to a great extent as fuel in many localities. During the last years these areas are being cultivated more and more.

Literature:

»Handbuch der regionalen Geologie« herausgeben von G. Steinmann und O. Wilkens. 1. Band 2. Abt. Dänemark von N. V. Ussing. Heidelberg 1910.

The papers of the Geological Survey of Denmark (Danmarks geologiske Undersøgelse) and of the Danish Geological Society (Dansk geologisk Forening).

The Utilization of the Acreage.

Since 1861 statistics have been collected, as a rule, every fifth year, as to the use of the acreage. The last was collected in 1912 but detailed information is not yet available. —

The acreage was used as given below in km² (100 ha).

	1861.	1888.	1907.
To Wheat	620	485	405
Rye	2090	2809	2760
Barley	3033	2981	2337
Oats	3581	4261	4030
Mixed Grains (ripe)	—	930	1695
Total Grains	9324	11,466	11,227

	1861.	1888.	1907.
To Potatoes	305	523	541
Other Roots	25	529	2543
Soiling crops, Buckwheat etc.	1170	1038	1076
Grass and Clover	7768	9199	8585
Fallows	1788	2587	1829
Meadows	2392	2294	2229
Total Fields & Meadows	22,772	27,636	28,030

	1861.	1888.	1907.
To Fences, Gardens & Nurseries	—	283	519
Forests and Plantations ..	1747	2268	3242
Heaths and Heather Hills.	7376	4075	3171
Drifting sands and downs	5536	406	511
Swamps, Ponds and water-area		3318	3496
Total.....	37,431	37,986	38,969

The total agricultural area is 75% of the total area of Denmark, while the proper cultivated area is 66% of the total area. The utilization of the cultivated area was.

	1866. %	1888. %	1907. %
Grain area......................	46.5	45.2	43.5
Root area	1.9	4.2	12.0
Other Crops area	3.9	2.4	1.0
Fallows area....................	9.3	10.3	8.9
Soiling crops and Grass crops area	38.4	37.9	34.6
Total....	100	100	100

The Distribution af Landed Property.

There are about 250,000 landed properties in Denmark. The distribution of these according to size is as follows: 8,900 properties comprise more than 60 ha; 60,900 have between 15 and 60 ha and half the area of the country belongs to this group of medium sized and large farms; 46,600 properties comprise from 5 to 15 ha and 133,600, less than 5 ha or no land at all. (This last group consist chiefly of the »housemen« or small holders, country tradesmen and farm laborers).

The Land Values.

The basis for the taxation of landed properties has hitherto been the »Hartkorn« so that every property was estimated at a certain Hartkorn and though this is about to be abandoned, as a taxation basis, it is likely to be connected yet for many years with the price statistics, partly in order to compare with the older statistics and partly because a »Tønde Hartkorn« approximately has the same value in the different localities. Properties with up to 1 Td. Hrtk. are classed as »Houses«, with more than that, as farms.

The average salesprice in voluntary deals was as follows per Td. Hrtk. without stock and implements.

	The average of:		
	1895—99	1900—04	1905—09
Houses:	Kr.	Kr.	Kr.
The Islands	8774	8870	9366
Jutland	8069	8487	9881
The whole country	8302	8628	9683
Farms:			
The Islands	5220	5208	6014
Jutland	5239	5258	6225
The whole country	5230	5235	6127

Exports and Imports of Agricultural Products.

The value of exports of domestic products was greater (+) or less (—) than the importation of foreign products for consumption:

	1908 Mill. Kr.	1909 Mill. Kr.	1910 Mill. Kr.	1911 Mill. Kr.
Butter	+ 177.81	+ 175.01	+ 177.46	+ 187.86
Cream & Milk	+ 5.92	+ 8.02	+ 11.60	+ 15.25
Eggs	+ 26.25	+ 24.53	+ 25.31	+ 27.75
Bacon	+ 101.76	+ 104.34	+ 117.16	+ 120.09
Horses	+ 6.89	+ 11.64	+ 12.62	+ 14.18
Cattle	+ 27.04	+ 26.64	+ 30.72	+ 36.18
Sheep	+ 0.02	+ 0.01	+ 0.02	+ 0.00
Sows & Pigs	— 0.01	— 0.03	— 0.07	— 0,24
Live Poultry	— 0.13	— 0.10	— 0.15	— 0.05
Beef	+ 5.35	+ 7.89	+ 10.54	+ 8.57
Mutton	— 0.17	— 0.28	— 0.47	— 0.76
Flesh of other Animals and Slaughterhouse By-products	+ 3.13	+ 4.41	+ 4,95	+ 5.35

	1908 Mill. Kr.	1909 Mill. Kr.	1910 Mill. Kr.	1911 Mill. Kr.
Fats, Oleo oil and Margarine	— 19.58	— 16.20	— 8.29	— 5.21
Other provisions from domestic animals chiefly cheese	— 1.02	— 1.04	— 0.48	— 0.19
Hides and Skins, Bones, Tallow etc.	+ 8.31	+ 10.06	+ 8.57	+ 7.49
Grains	— 60.00	— 73.95	— 60.21	— 64.40
Do. ground	— 10.74	— 13.52	— 13.79	— 14.27
Feedstuffs	— 61.31	— 64.16	— 55.54	— 62.30
Hay und Straw	+ 0.74	+ 1.20	+ 0.76	+ 0.89
Seeds	— 7.92	— 7.80	— 5.68	— 4.33
Foreign Fertilizers	— 9.63	— 9.70	— 10.53	— 13.08
Estimated value of Feedstuffs in imported Oilseeds	— 2.90	— 3.20	— 4.20	— 4.80
Totals	+ 189.81	+ 183.77	+ 240.20	+ 254.36

The Agricultural Credit Conditions.

The agricultural real estate credit is chiefly provided by credit associations and saving banks, furthermore by entailed funds, foundations, life insurance societies, banks etc. Not until 1851 were the first credit associations organized in Denmark and there are now twelve, of which the nine are devoted to country properties and two of these are peculiar in as much as the State insures the payment of the interest for the creditors. As a rule the credit associations grant loans only on first mortgages; their bonds may be issued on unstamped paper and are either issued to name or to bearer; they may be transferred without the use of stamped paper. Loans are only granted up to $^{3}/_{5}$ (60 %) of the value of the property, the borrowers are solidary responsible for the loans granted within their series and these have — as a rule — to be amortized by annual deductions. Yet, the credit associations are permitted to grant totally or partially non amortizeable loans but these must not exceed $^{1}/_{8}$ of the valuation of a property and the balance of the loan must be amortized in the course of 60 years*).

Loans on second mortgages are granted by 9 hypothec associations which — like the credit ass^{ns} — are favored in the matter of stamp duty and their bonds are issued to name.

The interest on loans in the credit ass^{ns} has during the latter-years been rather above 4 %, while in the hypothec ass^{ns} they are ½ % to 1 % higher. The debt percentage on the Danish farms, sold voluntarily in the years 1905—09 was about 50, while for »houses« it was about 34.

The agricultural »Short-loans associations« (Forskudsforeninger), started under the law of March 26te 1898. offer working loans to the farmers. There are 168 such with an original government loan of 5 Million Kr. on which an annual interest of 3.5 % is paid. The interest charged must not exceed 5 % according to the above mentioned law. These associations offer temporary working loans (for buying seed corn, feedstuffs, fertilizers, renewal of stock and inventory, wages etc.). A working loan cannot exceed 3,000.^{00} Kr. and must not be granted for more than 9 months.

Literature: M. P. Blem. The Danish Credit Societies, a reprint from »Denmark Abroad«.

The Agricultural Associations.

The associated activities have developed freely in the Danish as in the English agriculture, without the initiative of, or interference from the government and legislature, and has for a long time played an important role.

The oldest association is the kongelige dansk Landhusholdningsselskab (Royal Danish Agricultural Society) established 1769. — It's activities include the whole agricultural industry and it is frequently employed by the government as an advisory board and it administers, on behalf of the agricultural department, the counselors' activities, the subsidized implement and machinery tests and the State appropriation

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*) It must be remembered that the interest in the associations is in reality higher than the nominal as the borrower receives bonds and must sell these at market value — sometimes as low as 89 % — and there is furthermore an office expense and reservefund sharge of 0.19 %.

(Kr. 25.000) for the extended education of the creamery employees. In 1872 the society entered in direct connection with the local agricultural societies by allowing half of it's directors to be elected by those local societies which are members of the Royal society.

The first local society was organized in the beginning ot the 19th century, now (1913) there are 119. Their purpose is to promote the general agricultural development by lecture meetings, livestock shows, expositions, by inaugurating field experiments, by offering premiums for the best cultivated housemen's (small holder's) lots, by organizing various associations with special purposes, etc. The provincial agricultural societies have combined in joint associations, thus: the association of Jutland agric. societies, the associated agric. societies in Seeland diocese, the associated agric. societies in Fyn diocese and the associated Lolland-Falster agric. societies. These joint associations work in a broader manner, than the local societies are able to, for the development of agricultural conditions and act as a common representative for the individual provincial agricultural interests. They have again combined in the »samvirkende danske Landboforeninger« (associated Danish agricultural societies), the aim of which is to decide which matters shall be presented for discussion at the annual meeting of delegates from the provincial associations, to increase the influence of the provincial associated societies by united action, and to represent all the local associations under the provincial associations etc.

At the beginning of the century, the Housemen's associations were organized, the chief aim of which is to promote the small lot cultivation and the various small lot side lines. There are now (1913) about 830 local Housemen's associations joined in five provincial associations which again have organized the associated Danish Housemen's associations which as a central organization represents the associations before the Government, Institutions etc.

The Agricultural as well as the Housemen's associations receive State subsidies for the promotion of plantculture, animal husbandry, counselors' activities etc.

Besides these societies, there are series of associations aiming at promoting special branches of agriculture: dairying, animal husbandry, poultry breeding, plantculture etc. Thus the creameries have combined in local creamery associations, which again co-operate in provincial joint associations which in turn are centralized in the associated Danish creamery association. Furthermore the butter- and cheesefactory managers (chief buttermakers) and assistants have combined in the Danish Butter- and Cheesemakers Association, aiming to improve themselves and stand by each other. Within the animal husbandry there is an extended organization of associations, as there are — all over the country — a large number of breeding associations. There were thus in 1913, 267 horsebreeding-, 1072 cattlebreeding-, 240 Swinebreeding-, and 104 sheepbreeding-associations as well as 524 Control associations (cow testing) the chief aim of which is, by investigations of the amount of feed given to and milk (with it's fat percentage) yielded by the individual cows in the herds of the members, to show up and improve the rentability of the cattle industry, and to work for the formation of lines of cattle the milk from which should give an increased butter yield. The origin of the cowtesting associations is in Denmark from where they have spread to other countries.

Furthermore there are (1912) 20 larger (besides several smaller) Insurance Associations, 4 Horticultural Societies, 3 large Poultry Associations which have consolidated in Denmark's Poultry Association, 21 Associations for Insurance against damage from hail and storms, 168 Short loan associations, 8 Beneficent associations, 3 Servant's Premiums associations etc. etc.

The co-operative associations have become of great importance for Danish agriculture. The rule for these associations is that they aim only at economical purposes, that each member has one, and only one, vote, that the annual surplus is distributed to the members in proportion to the business transacted by them and that the members themselves provide the necessary capital on the basis of guaranteeing loans with solidary notes.

The co-operative stores (consumer's associations) are the oldest in Denmark, the first being started in 1866; now (1912) there are about 1300 which have joined the Central association for Danish Co-operative Stores, the chief purpose of which is to buy the supplies for the various associations, but, when forced to it, it has even branched out by building factories.

Of the co-operative production associations there were (1912), among others, 1188 co-operative creameriers (butter- and cheese-factories), the first organized in 1882, 41 co-operative slaughterhouses (Bacon factories) of which the first was started in 1887, the Danish Co-operative Egg Export association started in 1895 and comprising 550 local associations with some 45,000 members. There are furthermore sundry co-operative associations for buying feed stuffs fertilizers etc., export associations (for butter, cattle, potatoes etc.), co-operative fruit preserving assns. etc., etc. The most important of all these co-operative enterprises have joined in a representative Co-operative Committee, the aim of which is to develop the activities of the co-operative associations and strengthen their position both in- and out-wardly in relation to the international co-operative movement.

The industries closely allied to agriculture have also developed a lively society organization; thus may be mentioned Danish Forest Association, working to promote forestry and allied industries, Danish Hunting Association, General Danish Horticultural Society, formed by the gardeners in the country, Danish Heath Ass^n^. with the aim of promoting the utilization of the Jutland heaths, Danish Wind Electricity Society offering assistance in organizing electrical plants, and Freshwater Fishing Ass^n^ besides numerous other associations. Finally there are not a few associations allied to agriculture with professional personal aims.

Literature: Landøkonomisk Aarbog (Agricultural Yearbook) by H. C. Larsen which contains a complete synopsis of all agricultural organizations, co-operative associations etc. with names of the officers.

The Basis of Land Assessment.

Up to July 1st 1904, the basis for land assessments has been the Hartkorn of the soil, such as found in the property register of the Agricultural Department — the matricula. The word »Hartkorn« signifies literally hard corn and originated from the time before 1660, when this designation was used as a single expression for various prestations — rent — which the tenants (cultivators) had to render the owners of the estates.

According to these prestations, converted into »Hartkorn«, taxes and Hartkorn designated — even then — the measure by which taxes and dues to the government were assessed on the land and the designation has been retained in this sense.

We have had three matriculæ proper, the matricula of 1664, (the matricula) of 1688 and (the matricula) of 1844. The last matricula was started according to a Royal decree of 1804 and took effect Jan. 1st 1844. The matricula is based on a survey of the whole agricultural area as well as on a valuation of it. Hence all the farms were surveyed and mapped out, so that a collection of maps over all the farms was secured on a scale of 1 to 4000. The basic idea for the valuation — the appraisement — has been that it should be made in accordance with the surplus or the net profit which the said piece of land would yield by a suitable use and an average cultivation. Hence it was also the idea from the start that not only the value of the land for growing crops but also the more or less favorable location for marketing the agricultural products and similar conditions which might affect the net profit, should be considered in the appraisement; but this last element was given up as difficult and unreliable.

Certain numbers were used for the various classes of the soil — the soil rating. The best soil was put at 24, a soil assumed to give half as great a net profit as the best was put at 12 and so on, the lowest number being $^1/_{24}$, yet soils on which nothing at all would thrive, such as driftsand or larger areas of water was put at o. The boundaries for the variously rated pieces were marked and the rates entered on the maps; after which it was calculated on this basis how large an area of the variously rated pieces belonged to each property, and, in order to compare the many different areas, a special unit value of 1 square Alen (»boniteret«) »assessed« area by which is meant 1 square »Alen« geometrical area rated at 24, was adopted. The »assessed« area of the single pieces is found by multiplying the geometrical area with the rating and dividing by 24. Finally the »assessed« area was converted into Hartkorn by fixing 72,000 square Alen = 28,369 square meters »assessed« soil as being 1 Td. Hartkorn. Thus 1 Td. Hartkorn is 28,369 square meter rated at 24, or a sufficiently large area of any other rating to equal 28,369 square meter soil rated at 24.

The Hartkorn is no longer the basis for real estate taxation by the State, as all the Hartkorn taxes were displaced partly by a real estate tax and partly by an income and property tax under two acts of May 15 1903 which took effect July 1904, and under a third act of same date the Hartkorn will evenso gradually (and totally after Jan 1st 1925) cease to be the basis for parish and county taxation inasmuch as the Hartkorn, even there, is gradually replaced by the real estate tax.

The basis for the real estate tax is the value, in the open market, of the real estate without stock, inventory, machines and other working material, but with buildings and immovables. The tax to the state is 1.1 p. m. (1 Kr. 10 Øre for 1000 Kr.) annually either of the valuation proper or, in certain cases, according to a reduction made under fixed rules; thus small lots or properties owned by the labouring class, by fishermen or tradespeople working without employees, are partially or totally relieved of the real estate tax. The valuation for real estate taxation is made by an appraisement committee. For this purpose the country is divided into 141 tax districts and a chairman is appointed for each district by the secretary of the treasury. Each tax district is divided into several appraisement districts each with an independent appraisement committee consisting of the appraisement chairman and two appraisers elected by the respective local authorities.

In valuing forest or industrial properties expert assistance may be called. The valuation is made on the basis of blanks, prescribed by the secretary of the treasury, which are sent to every owner of the property to be valued and which he is compelled to fill in. The owner must, in doing this, give a series of information as to the character of the property, the amount of debts and mortgages, income etc. and finally his personal valuation of the property, all as a guide for the appraisement committee which on the basis of the information thus obtained, by personal inspection and information otherwise secured, determines the value of the property.

To test the valuation of the appraisement committee there is organized a superior appraisement council, consisting of 8 members and a chairman of which the chairman and four members are appointed by the King, while the upper and lower house of the parliament each appoint two members. The superior appraisement council decides the complaints of valuations submitted to it, but may also, of its own volition, interfere and change a valuation which it deems incorrect.

The first valuation for real estate taxation took place July 1st 1904, the second July 1st 1909, and thereafter such valuations are to be made every tenth year, but in the period between the regular valuations, there are half-yearly valuations of properties which, on account of the erection of new buildings or similar causes may be deemed to have increased in value. If a property is subdivided a revaluation must also be made both of the property which has been subdivided and of the new property thus created.

It is shown by the above that the valuation for real estate taxation does not aim to get at the bare land value, but at the value in the open market of the land and buildings together. Several trial appraisements have been made all over the country during the last years, at the initiative of the department, aiming at finding the bare value of the land, so that the land and buildings might be taxed by themselves, but these experiments have not yet led to the proposal of new legislation.

Finally the attention is drawn to the act for a railroad tax of April 18th 1910, by which the increase in value of property, caused by the building of certain railroads, must be assessed with a special time-limited tax besides the regular perpetual real estate tax.

The State and Local Plant Breeding Experiments.

The plant breeding experiments are field experiments combined with chemical, botanical, pathological and bacteriological investigations. They are partly stationary and in charge of the government, partly local and in charge of the agricultural societies with subsidies from the Government.

The State experimental activities were organized by P. Nielsen in 1870 and are carried on at six fixed experiment stations, 3 on the islands and 3 in Jutland and 2 branch stations. They are:

Tylstrup per Tylstrup in northern Jutland (Vendsyssel) started in 1894. Area: 38 ha sandy loam, 38 ha low moorland and 52 ha high moorland.

Studsgaard per Studsgaard in central Jutland started in 1906. Area: 45 ha light sandy soil (heath), 15 ha good sandy loam near Borris in western Jutland, 11 ha low moorland and 22 ha high moorland near Herning.

Askov per Vejen in southern Jutland started 1886. Area: 23 ha clayey loam, 7 ha sandy loam and 6 ha high moorland.

Aarslev per Aarslev on Fyn started 1905. Area: 33 ha clayey loam.

Lyngby per Lyngby in northeastern Seeland, started 1890. Area: 52 ha clayey loam.

Tystofte per Tjæreby in southwestern Seeland, started 1886. Area: 30 ha clayey loam.

The Branch stations are Abed per Søllested on Lolland (2 ha good clayey loam) and Aakirkeby on Bornholm (3 ha heavy clayey loam).

Experiments as regards cultural conditions which are of interest to the whole country, but which may be assumed to depend on the soil and the climate in the various districts, are made on all or several stations at the same time. This holds good as regards experiments with species, varieties and families of cultivated plants, seedbreeding, time of sowing, amount of seed, methods of sowing, soil culture, soil improvement, rotations, »Forfrugt« *), manuring, fighting plant diseases etc. Other experiments, the results of which do not depend especially on climate, soil and other local conditions and hence may be considered of value for a larger area, are — on the other hand — made at a single or a few stations only, as for instance the manure preservation experiments at Aarslev and Studsgaard, experiments and work in improving agricultural plants at Tystofte and Lyngby and moor experiments at Jutland stations. Experiments with roots are carried on partly as perambulating experiments. Every series of experiments reach, as a rule, over several years, many — among them the stable manure and rotation experiments — over a great many years. — A common plan for the work with detailed rules for the starting and carrying on the experiments is prepared for each year's experiments.

The directors of the experiment stations, who also conduct the experiments, are appointed by the agricultural department and each one is responsible for the running of his station. The compiling of the experiment results and the preparing of the reports for each series of experiments is turned over to one of the experiment directors as reporter. He — jointly with the directors of the stations where the experiments have been made — is responsible for the correctness of the material and it's presentation. The reports, which are approved by all the directors, are published in the organ of the experiment interests »Tidsskrift for Landbrugets Planteavl« and are also published separately for the book trade. Short reports as regards the results of the experiments are furthermore sent to all the daily and agricultural papers. —

The administration of the experimental activities in plant breeding by the State is done by a State Plantbreeding Committee, Copenhagen, consisting of 3 members elected by respectively the Royal Danish agricultural society, the Royal veterinary and agricultural high school and the central association of the local agricultural societies, under the approval of the department of agriculture. The committee forms the connecting link between the department and the experimental activities, approves the plans and budgets, publishes the journal and the reports and supervises the whole activity. The appropriations now aggregate 230,000 Kr. annually. —

The Local Plantbreeding Experiments commenced in 1895 and are now made by the more than 100 local agricultural societies and the provincial associations of these, as well as several of the associations of small holders. — In con-

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*) This is a technical designation for the crop which precedes another crop.

trast to the State experiments especial attention is paid to cultural conditions which are affected by the small variations in the surroundings or which turn up within a relatively small area, thus especially all questions as to the use of manure especially commercial fertilizers, lime, marl etc. and hence the results have, singly, chiefly only value in the locality — on the farm, where the experiment is made; collectively and treated statistically, on the other hand, they may be of value for larger territories.

Members of the societies may, on specially agreed conditions, have local experiments prepared on their fields. They are planned and conducted by local plantbreeding committees appointed by the societies and carried out by the counselor or assistants engaged by them. The local committees cooperate in each province by annual joint meetings where the experiment results of the past year are presented in a collective report for that province and this is discussed as well as problems and plans for the next year's experiments.

In each of the four provinces Jutland, Fyn, Seeland and Lolland-Falster, there is furthermore a provincial plant breeding committee with a counsellor in plant breeding. These have charge of the above mentioned co-operation between the local plant breeding committees and collect and publish their reports, supervise and guide, through their counselors, experiments and investigations of special interest for that province or for the whole country. — In the last case it is done after negotiations at the annual meetings of the provincial committees and between these and the State plantbreeding committee, the State experiment directors etc.

State subsidies are granted the societies for their experiments and other measures for the promotion of the plant breeding on condition that the societies provide half of the total expenses out of their own funds. The subsidies aggregate about 125,000 Kr. annually.

Litterature:

Tidsskrift for Landbrugets Planteavl.

Aarsberetning fra Statens Planteavlsudvalg.

Arbejdsplan for Statens Forsøg i Plantekultur.

Beretning om Planteavlsarbejdet i Landboforeningerne i Jylland.

Beretning om Landboforeningernes Virksomhed for Planteavlen paa Sjælland.

Beretning om lokale Markforsøg, udførte af De samvirkende Landboforeninger i Fyns Stift.

Beretning om De samvirkende lolland-falsterske Landboforeningers Virksomhed for Planteavlen paa Lolland-Falster.

The Agricultural Experiment Laboratory

of the

Royal Veterinary and Agricultural High-school.

That part of the Danish experimental activity which takes place in the »experiment laboratory« comprises experiments for the advance of agriculture, notably dairying and animal husbandry as well as the allied industries. Although this is the field of the laboratory work, there are on the site of the laboratory in Copenhagen neither a creamery, a dairy nor experimental stables. This condition, which also astonishes visiting foreigners, is explained by the origin and whole development of the experimental work.

In the year 1875, the later so renowned experimenter, Docent Fjord began some experiments at the request of practical farmers to find out how the dairies could best preserve their stock of ice. The experiments promised so much information that the farmers requested Fjord — even before they were concluded — to extend them to finding out the most economical use of ice in the dairy industry.

These experiments, which gradually covered cream raising and skimming by various methods of cooling, had to be made in the dairies proper all over the country and were, when the separator was invented shortly after, extended to comprise experiments in the use of this machine.

The question as to the influence of the separators, through the cream on the butter and through the milk on the cheese, started a long series of experiments all over the country among the dairies and the creameries, which are yet continued and which were aimed to throw light on the various problems of the whole dairy industry. It is due chiefly to these experiments that centrifugal creaming, pasteurization and the rational ripening of the cream was introduced so quickly in the Danish creameries.

Besides the experiments proper, the experiment laboratory also assisted the creameries in other ways as for instance by assisting them to score their butter. For this purpose the laboratory calls for a firkin butter from each creamery at least thrice a year, and has it scored by reliable judges. Thus the creameries are informed of any eventual defects in their butter and at the same time a review is obtained of the whole country's butter production. These butter scorings are now included as a link in the measures taken — under the act of April 12th 1911 — to improve the quality of the Danish butter.

The question put to Fjord by the farmers whether separated milk was equally good, for feeding calves and pigs, as the hand skimmed milk, led the laboratory on to feeding experiments with cattle and swine.

As the creamery experiments gave such good results. Fjord determined also to try to carry out the feeding experiments in an equally practical manner by making them on the farms proper. This had the advantage that the work was done under the same conditions as those under which the experiment results should be applied by others, and whatever may — perhaps — be lost in exactness through this system is counterbalanced by the possibility of running several experiments at the same time and with many cows in each experiment.

The experiments with separated milk was the first of a long series of feeding experiments round about on the farms which are yet continued and which, among other effects, contributed essentially to induce the farmers to use roots in their rations for milchcows to such a great extent as is now done. The experiments of the laboratory which thus have grown up from a small beginning, comprise now — besides the creamery experiments — feeding and raising experiments with cattle, horses, swine and poultry as well as slaughter and salting experiments in the bacon factories and the places where they were made are spread so as to cover the whole country.

The activity is maintained by the State and the aim is continuously to assist the creamery and agricultural industries directly by experiments with practical purposes. In order to do this the experiments are, as before mentioned, made in several localities in the creameries and on the farms proper. These are placed by the owners at the disposal of the laboratory free of charge, but the latter pays all the necessary expenses directly connected with the experiments just as it does the work and superintends it with it's own employees.

The whole system of these experiments, has the great advantage, that it maintains the interest in, and comprehension of, the experiments in the creameries ·and on the farms. In order to be in constant touch with the practical work, the laboratory holds annual meetings where the plans for the experiments and their results are discussed with the practical and scientific creamerymen and farmers.

Although the experiments proper are made all over the country, the results gained and all the records are sent to

Copenhagen, for compilation, where the laboratory has its own buildings with rooms for administration, chemical and bacteriological laboratories and cool storage for the butter scorings.

In the course of time the experiment laboratory complex has been increased with buildings for an animal pathological and physiological department, the aïm of which is to make scientific experiments, in conjunction with the above described practical ones, for the benefit of Danish agriculture.

Literature: Forsøgslaboratoriets 82 Beretninger.

Statsanstalten Dansk Frøkontrol.

(Danish Government Seed Control).

»Dansk Frøkontrol« was organized as a private enterprise in 1871 by E. Møller Holst; in 1891 the government undertook the management and it is now the oldest seed control institution in the world, since the one started by privy counselor Nobbe in 1869 in Tharand, Saxony has ceased operation. The aim is to provide the farmers, seed breeders and seed merchants with information as to the quality of the seeds which they have to use or sell. —

The tests comprise the determination of a) the genuineness and place of origin (250 to 500 gram are tested for foreign admixtures), b) purity (2 average samples are weighed off from the sample at hand, these are examined very closely and divided into pure seed, waste, foreign cultured seed and weed seeds, the specially noxious weed seeds are also given in numbers per Kg. of the seed. A diaphanoscope with an especially calculated concave mirror, constructed by the Danish seed control in 1910, is used in determining the purity of the more difficult grass seeds; this is now also in use in several foreign seed testing institutions. c) The weight of 1000 fresh seeds and, provided the sample has been sent in an air tight closed vessel, also the dry weight of 1000 seeds and the water contents, (drying for 5 hours at 100° C.), furthermore d) the vitality and germinating power (6 sets of 100 seeds of the pure seed is germinated, clover, grass and similar seeds on a Jacobsen's germinating apparatus, the grains in damp sand, beta species in damp blotting paper); finally the content of pure germinating seeds in the samples is calculated from the data thus found. From the very start of Møller Holst's activity, the tests have been made with the greatest accuracy, and this applies fully as much to the taking of the samples for testing.

These rules for seed testing hold good in the main in Sweden and Norway also, where, however, there are several smaller institutions and not, as in Denmark, one large station.

The seed control was used but to a small extent during the first years; only when a seed business (Markfrøkontoret) was started, where the seed was sold with a certain guaranty for purity and vitality etc., and the farmers understood that they got a far higher yield when buying such seed, the employment of the seed control increased. At the same time the quality of the seeds was improved; the common kinds of clover- and grass-seed on the market contained — when the seed control first started — generally only about 35% pure germinating seeds. The number of analyses increased steadily the first years and was, at the death of Møller Holst in 1889, about 1500 annually and kept about that number up to 1902; but from that time it has increased continually and fast so that in the season 1911—12 there were tested some 14,000 samples distributed as follows: 550 samples grain, 6,600 grass-seed, 2,550 clover- and other legumen-seeds, 3,700 root- and similar seeds, and 600 samples sundry seeds. The seed merchants have sent 6,900 and the farmers, 6,800; of these samples 2,400 are analyses to control the guarantees given for purity, germinating power etc.

As shown it is chiefly samples of agricultural seeds which are tested, nevertheless there are tested about 150 samples of various species tree seeds annually; there have, however, especially in former years, been made several tests with weed seeds of which a report may be found in »Jahresbericht der Vereinigung für angewandte Botanik« vol. 8 1910 as well as a more detailed report in »Tidsskrift for Landbrugets Planteavl« vol. 17; in this journal is also found the annual, rather comprehensive, reports on the activity of the seed control. An especially published larger work »Dansk Frøkontrol 1896—1907« contains a complete review of the activity of the seed control during that time. Furthermore a series of longer and shorter articles on seed control, seed trade and seed breeding have been published in the above mentioned journal as well as in agricultural weeklies and the agricultural encyclopedia etc. This last subject — seed breeding — has, especially lately, proved a live one as demonstrated by the fact that the seedcrop area in Denmark 1912 was four times as large as five years before. This has had the effect — among others — as regards several important seed species, that Denmark, instead of importing, is now exporting cocks-foot seed, meadow fescue grass, field brome grass, meadow grass, navew and turnip seed.

A commission has been appointed as counsel, as regards the seed control, to the agricultural department, in which there are two representatives of agricultural science, two farmers and two seed merchants (the last elected by the merchant's association). Professor T. Westermann is the chairman of the seed control commission.

The seed control is located in a special building erected in 1907 at Bülowsvej 15 Copenhagen V; there are, besides the director (since 1903 K. Dorph-Petersen), three permanent chief assistants, six permanent and twenty assistants paid by the hour and one custodian. The expenses of the seed control were, in 1911—12, 34,190 Kr. of which 32,870 Kr. were covered by the fees for analyses (from 1 to 7 Kr.) so that the state subsidy was 1320 Kr. —

Experiments with Agricultural Implements and Machinery.

Prior to 1872 there were no regular systematic experiments with or tests of agricultural implements and machines, although isolated tests of various implements — notably those for cultivating the soil — were made here and there. Yet it should be mentioned in this connection that the Royal Danish agricultural society did a great work, as early as the middle of last century by arranging test-plowings in order to promote the knowledge and use of swingplows.

In 1872 an important change took place in these conditions, as it had been resolved the previous year that the Danish implement and machinery tests should have a fixed and previously arranged plan as comparative tests of certain groups of implements to be made in connection with the large farmer's meetings. The first of these tests was made in Nykøbing Falster in 1872.

This plan was followed in the next twenty years, but as these farmer's meetings took place several years apart and as there was a lively and increasing demand for machines, this system for the tests was no longer satisfactory even if some extra tests were made through the initiative of the Royal Agricultural Society, in some of the years where there was no farmer's meeting. —

In 1892 an essential change took place by the Government appropriating 5000.^{00} Kr. from April 1st for the testing of agricultural implements and machines. These state subsidized tests are administrated by the Royal agricultural society, through a special committee, and the amount has — as a rule — been used so that 4000.^{00} Kr. have been spent on the larger comparative tests while 1000.^{00} Kr., with the approval of the Agricultural Department, has been placed at the disposal of the State counselor in the use of machines and has been used for single tests as a preparation for or in connection with the large comparative tests.

The results of these subsidized tests are published in 28 reports in »Tidsskrift for Landøkonomi« and are now also reprinted in pamphlet form. Each report contains a larger test and — in several instances — in addition one or more smaller tests made about the same time. The reports contain tests with most of the machines and implements used in agriculture and several of the most used groups have been tested several times in the past years as demanded by the developments made.

Litterature:
Tidsskrift for Landøkonomi.

The Agricultural Education.

A. Practical Training.

The practical training is almost completely left to the private initiative and, as regards the smaller farmers, it is given at home, by relations or by working on a salary for strangers. Owners of larger farms, or people in other professions, usually send their boys, which are to be trained in agriculture, to wellknown expert owners or renters of large farms, where they generally spend about 3 years participating constantly in all the work going on, often a year each on different farms. If it is required that the apprentice shall board with the family a fee of a couple of hundred Kroner or more is usually paid especially for the first year but if such a demand is not made, the apprentice may — especially if brought up in the country — obtain a salary of a couple of hundred Kroner annually.

The Royal agricultural society organized, as early as 90 years ago, such an apprentice system which still exists and which — no doubt — in the beginning has served as a model for private training of apprentices and been much esteemed all the time. The apprentices serve 3 years on farms in different parts of the country, one year on each farm. They partake in all kinds of labour, and their activity is controlled by the society, among other ways, by a diary sent in for inspection each year. The apprentices are amenable under the servant's act and obtain a salary of 150 Kr. to 250 Kr. annually, but are favoured somewhat more as to board and lodging than the regular help. About 2400 young men have, up to date, been trained in this manner under the society which has furthermore, since 1854, supervised the training of herdsmen apprentices (Foderlærlinge) on a similar system. Finally the society has, at different times, arranged other practical specialized apprentice-ships thus in draining, irrigation, cultivation of root crops and dairying. Lately the government has commenced subsidizing the practical training in small lot cultivation and in the sidelines of agriculture, under the law of May 8th 1898, appropriating up to 5000 Kr. annually for this purpose.

B. Theoretical Agricultural Instruction.

The modern practical agricultural training sometimes employs literary guidance or lectures as means of instilling knowledge and comprehensiveness, but this takes place only in winter evenings and hence hardly plays any great role. Under the continuous development of agriculture the view is gaining more and more ground, that the farmer, in order to solve his problems, must supplement the knowledge gained in practical work by securing information from the experience of others, and that, by reading or otherwise, he must try to follow the development. As this offers great difficulties for the practical farmers and as the majority of them have not acquired professional theoretical training, it is therefore provided partly directly by the aid of the government, partly by subsidies to a very extended guidance in experiments, demonstrations and by lectures which are often arranged as short courses. This activity is effected chiefly by counsellors of whom there are more than 100 engaged under the government, the Royal agricultural society, the local agricultural societies and the heath cultivation society. For the small lot holders (Husmænd) here are furthermore excursions under guidance and with government aid as means of education. Yet it is generally acknowledged that the assistance thus given is fully utilized only when the farmers have previously acquired a certain fund of theoretical knowledge, and to make it easier to absorb this, there has been, established an increasing number of

Private Agricultural Schools.

These schools are usually located in the country and furnish — with a single exception — exclusively theoretical instruction, which is usually given in the shape of lectures comprising agriculture in general or special branches thereof. The instruction is subsidized by the government under the laws of April 12th 1892 and January 17th 1908 which comprises agricultural schools proper, dairy schools, horticultural schools, schools for women in domestic economy and the »People's highschools« (Folkehøjskoler) — a special type of schools. with religious and patriotic aims, originated in Denmark and copied in several other countries. The size of the government subsidy depends on the expenses for school buildings, teachers and school materials, and cannot, without a special appropriation, exceed 3000 Kr. annually for a school. Yet poor students may furthermore be granted a subsidy of about 20 Kr. each per month. In order to be considered, a school must have existed at least 2 years and have been visited by at least 10 annual students (average number during the whole year).

The following survey of the shools approved by the government is for the fiscal year 1910—11*).

The number of People's high schools receiving government aid has been 80 during the said fiscal year and the total number of male students at these and the agricultural schools were 4,945, of female students 3,148. The government subsidy amounted that year to 489,200 Kr. of which 187,000 Kr. were given as direct subsidy to the schools and 278,700 Kr. as subsidy to the students. —

Besides these schools there are several similar ones which are not recognized by the government and further a school (The Classenske Agricultural school at Næsgaard) where both practice and theory is taught in a course of 17 months. Some schools give short courses of 1 to 4 weeks besides the regular courses and there is furthermore, at several schools, established special courses lasting about a month for cow testing ass^ns. secretaries (Control assistants), who assist the farmers in the testing of the rentability of the individual cows. These courses receive considerable subventions from the government

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*) By courtesy of the government inspector of these schools L. Feilberg Esq.

	Number Schools	Length of Courses in Months	Average number of hours		Number of Students
			Professional Subjects	Natural Sciences	
a. Agric. Schools proper	13	5-6-9	460	262	1014
b. Agric. schools for small lot holders (Husmænd).........	3	5-6	323	184	271
c. Dairy schools..............	2	4-8	407	260	138
d. Horticultural schools (including practical instruction) ..	3	5-12	414	345	63
e. People's High schools with special courses in agriculture	3	5	226	107	89
f. People's high schools without special agricultural courses, but giving more than 50 hours agricultural instruction to the male students	35	5	106	82	1341

and so do two specially authorized dairy schools where post-graduate courses of 8 month gives male and female butter and cheesemakers a chance for further theoretical training. —

II. The Royal Veterinary and Agricultural Highschool.

This school was established in Copenhagen as a state institution according to law of March 8th 1856, and offers a higher education to farmers, gardeners, foresters, veterinarians and surveyors. The number of agricultural students has increased steadily during the last years and reached 166 in the fiscal year 1910—11. The agricultural instruction comprises a general course of 20 months and four extension courses of 20 months each. —

a. The General Course. A special preparatory examination is required to matriculate as a »student« in this course, but any one may enter as an »extraordinary attendant«, follow the instruction and submit to the examination. The regular student's chief privelege is that they alone have a chance for scholarships at the highschool and the right to take an examination at the end of one of the four extension courses.

Usually at least one quarter of all the students may secure free instruction and of these again half get the full scholarship with 20 to 30 Kr. each per month. —

The instruction in this course comprises lectures and examinations in the following branches:

Physics and Meteorology, Chemistry, knowledge of soils, Botany, Zoology and agricultural zoology, Anatomy, Animal Husbandry, Mechanics, Soil Culture, Cultivation of farm crops Dairying, Agricultural book keeping, General Agriculture and Plant pathology.

In the first and second semesters there is furthermore about 38 hours weekly laboratory practice in chemistry, exercises in botany, surveying and drawing besides various botanical excursions. In the third semester 11 to 12 hours and in the fourth 5 to 6 hours are used weekly in practice in agricultural chemistry, in the agricultural branches and in stock judging. After the two first semesters the students pass the first part of the examination in June; they then use fully a month in practical excercises in surveying and levelling and take the second part of the examination in April the following year. There are given 20 characters, 9 at the first and 11 at the second part. As a consequence of the admittance conditions several of the students meet with such a defective elementary preparation that it would seem difficult for them to get the full benefit of an instruction given under perfectly free forms, but as the agricultural students as a rule, are very diligent they nevertheless attain good knowledge considering the short period of instruction and — as a rule — finish by passing the examination.

b. The Extension Courses. With the quick development of agriculture and the increasing need of utilizing all possibilities within the different branches of agriculture, there is employment for a larger number specialists as leaders in experiments, counsellors, instructors etc. The general course does not offer these sufficient training and hence, as before said, four extension courses have been organized at the highschool in respectively fundamental sciences, science of agriculture, animal husbandry and dairying in such a manner as to include with these main branches sundry other allied ones.

The instruction here is mainly given as a guide for self application and as exercises, adapted for the development of independent judgement. All four courses commence every other year in September and close with an examination 20 months later in March or April. In order to be able to submit to an examination after these courses where the students have access to scholarships of 50 Kr. per month, it is required that he has been matriculated as a student at the general course and obtained 1st character at the examination.

The higher agricultural education has obtained a very important addition in these extension courses, but as the demands of agriculture have nevertheless not been fully satisfied by the present arrangement, plans are now under consideration for further development of the educational system.

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The Agricultural Counselors.

The first real counselor was the late Prf. Segelcke who, in 1862, was appointed by the agricultural society as dairy counselor*). He trained several assistants who were appointed by local agricultural societies. In 1876 the Royal agricultural society appointed furthermore a counselor in animal husbandry and, in 1882, one in plantculture. The agricultural counselors, activity organized and maintained by the State was started at the end of the eighties. The State counselors, now appointed, act in the following branches: agricultural chemistry (1), plantculture (2), animal husbandry (4), dairying (4), agricultural machinery (2), horticulture (1), plantdiseases (1), agricultural- and forestry-zoology (1) while two counselors, up to now, have taken care of the Danish agricultural interests in foreign countries (England and Germany).

Furthermore many associations have appointed counselors (in animal husbandry, plantculture, poultry breeding etc.) to whose salaries the State contributes. There are about 90 ofthese.

The State and association counselors make annual reports to the agricultural department. A considerable part ot the State counselors activities are administered by the Royal agricultural society on behalf of the agricultural department.

Litterature:
Landøkonomisk Aarbog.

Agronomy.

The Danish agriculture is strongly impressed by the existing highly developed dairy industry with an extended animal husbandry, so that the cultivation of the soil aims pre-eminently at producing forage. Of the ca. 2.6 million ha cultivated fields in the country about 44 % is used for the production of graincrops (and legumens) but the greatest part of the grain is used for feeding purposes and only a smaller part is sold directly. The relatively low grain prices, which obtain on account of the duty free importation of grainproducts and feedstuffs, prevent the sale and encourage the feeding of the graincrops. Thirtyfive percent of the agricultural land is covered by clover and grass and there is besides 22,300 ha meadows which are chiefly used for the production of hay as well as 120,000 ha natural grassfields which are used for pasturing. Finally 12 % of the cultivated area is used for cultivation of roots (chiefly for feeding purposes) and potatoes, and 3 % for soiling crops. The balance is mostly fallow land or carries seed crops, market plants, garden truck etc.

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*) Who was also the first professor in dairying appointed anywhere.

The rotations vary much, but the variations are — on most of the farms — of no essential importance, and it is aimed to practice the usual rotation as nearly as practical considerations allow. A system with eight crops is typical for the greatest part of the country. This system is often arranged — especially on medium good farms — as follows: 1) Fallow (whole, half or cultivated); 2) Wintergrains (chiefly rye); 3) Barley (on poor or cold soils often oats or mixed grains); 4) Roots (a few potatoes); 5) Oats (sometimes barley or mixed grains); 6) and 7) Clover and grass; 8) Oats (sometimes mixed grains). In the sugarbeet districts the system is often as follows: 1) Fallows; 2) Wheat; 3) Sugarbeets; 4) Barley; 5) Sugar- and fodder-beets; 6) Barley; 7) Clover and grass; 8) Oats. On the better farms in Jutland, the rotation is often about thus: 1) Wintergrains; 2) Fodder roots and potatoes; 3) Barley; 4) Mixed grains; 5) Roots; 6) Oats; 7) Clover and grass; 8) Clover and grass and half fallow. The whole fallow is often dropped in favor of soiling crops (vetches & oats, besides turnips), sometimes early potatoes; after that follows the wintergrains. On most farms there is a biennial grass-field in such a manner that the grass is cut or pastured only once in favor of a half fallow. Instead of the biennial grass-field there is often an annual cloverfield in the middle of the rotation and, at the end of the rotation, an annual kidney wetch (anthyllis vulneraria) or common yellow clover (medicago lupulina) with half fallow after the hay harvest. Often a 7 or 9 years rotation is substituted for the 8 yearly, but this does not cause any material change; if a 7 years rotation is used the clover is replaced by common bird's-foot-trefoil (lotus corniculatus). On dry, poor, sandy farms in Jutland the growing of summer grains is much reduced; the chief crops there are rye (not seldom after lupines as green manure), potatoes, turnips, carrots and, in some localities, buck-wheat, sometimes spurry, but the rotation is here often varied, often there is a 3 or 4 yearly grass crop and often there is rye twice in the rotation.

Barnyard manure plays the main role among the fertilizers. It is partly preserved in open stacks partly in manure sheds; the latter are used on about 20,000 (chiefly smaller) farms. The liquid manure is either more or less completely absorbed by the bedding or collected in watertight tanks which are found on some 90,000 farms. The barnyard manure is preferably used for the fodder roots (a small amount for the sugar beets) and the potatoes, usually 400 to 500 hkg per ha. The wheat receives 300 to 400 hkg while the rye but seldom gets barn manure. Furthermore the barn manure is used on the soiling crops, not seldom on the grass, but, as a rule, not on the spring grains, baring the fields sown with grass. The barn manure is hauled in the course of the summer for the wintergrains, in fall or winter for the root crops. On sandy soils the manure is preferably hauled out just before seeding time. The liquid manure is used on the biennial grassfields, on older pastures and, where possible, early in the spring, partly for beetroots and soiling crops as well as hayfields, more seldom on grainfields.

Commercial fertilizers are used, to a greatly increasing extent. The importation in hkg. was about.

	Chilisaltpetre	Potassium salts	Other Fertilizers
1890	5,000	10,000	300,000
1900	60,000	110,000	500,000
1910	260,000	150,000	1,000,000
1912	360,000	260,000	1,190,000

Commercial fertilizers are used most extensively in the sugar beet growing districts (chiefly chilisaltpetre and superphosphates) and when reclaiming heaths and marshes, as well as on meadows (phosphoric acid and potassium fertilizers). — There is now generally used — all over the country — larger or smaller additions of commercial fertilizers both for grain and for roots, potatoes and seedfields. As a guide as to the kind and amount to use, local fertilizing experiments have been made on about 10,000 farms during the last 15 years. — Sulphate of ammonia, Norwegian saltpetre and calcium cyanamide are, as yet, used only to a very small extent; the farmers demand lower prices in order to use them. The relatively higher prices of Thomasslag and the potassium salts also prevent the extensive use ot these fertilizers.

The soil cultivation is, in the main, as follows: the stubble field is, if possible, shallow plowed, at once after harvest with quadruple plows, some 10 or 12 cm deep or plowed with single or double plow some 15 to 17 cm and then harrowed lightly and rolled. In the fall the said areas are plowed 20 to 25 cm deep for root crops. The spring cultivation commences as soon as the soil is dry enough and is started with a dragging or a light harrowing followed by a repeated treatment with heavy harrows preferably with »cultivators« (spring teeth harrows). After smoothing with a light harrow the soil is ready for seeding. An especially deep cultivation (subsoil plowing) is seldom given as no favorable effects have been observed thereby. In former times a large number of harrows and plows, notably German and American, were imported; but, during the later years, the home industry has developed greatly and agricultural implements of Danish manufacture are now common and hold their own with the foreign ones both as to quality and price.

The cultivated plants are the same — as regards kinds — as in the middle Europe, but many new families and species have been raised partly at the State experiment stations, partly by private parties, and if, when tested, these are found superior to the foreign species, they are generally introduced quickly. Of wheat the squarehead is yet cultivated to a large extent, but the »grenadier« the »Wilhelmina« and especially the three new Danish species »Smaahvede« (small wheat), »Stand wheat« (from Tystofte experiment station) and »Storakshvede« (large headed wheat, from Abed plant breeding station) have all gained quite a foothold. Spring wheat is not grown. Of rye species the Danish »Brattingsborg« (Brittany rye) and the »Petkus« rye predominate.

Two rowed barley is generally found on the best farms and the improved families of »Prentice«, especially Tystofte »Prentice«, have soon displaced all other species. Here and there the »Princess«, the »Jane« and the »Goldthorpe« barley may be found. Six rowed barley is chiefly grown in northern and western Jutland as well as in the vicinity of Copenhagen. The older and foreign species of the above are now displaced by the two Danish species: the late ripening »Korsbyg« (cross barley) from Tystofte and Erh. Frederiksen's early matured six rowed barley. Of winter barleys, which as yet are only grown to a small extent, valuable new species (from Lyngby experiment station), two rowed as well as six rowed, have been bred. Several species of oats are grown, such as the »Danish« (identical in the main with »Propstei« oats), »Ligowo« oats etc., but the older and foreign species are displaced especially by the modern Danish ones: »yellow Næsgaard« and »yellow-white Tystofte« as well as — here and there — by »Svaløf's triumph« and »Schlanstedt« oats. In Jutland the so called »gray oats«, hardy and thriving on poor soil, are grown on the sand and fenlands. Selected types of this seem much better than the very many mixed main species. Of peas, which on the whole are grown very little and generally mixed with oats, »the yellow Snedinge« and »marbled Glänö« peas are mostly used. Here and there winter peas are grown mixed with rye, and a winter resistant vicia sativa (grown at Lyngby experiment station) is used in the same manner. Among the fodder beets, the beetroot (beta vulgaris) prevails, nearly everywhere on the islands the improved Danish Barres family is grown. The rutabaga and turnips are the most important roots in Jutland and of these, Danish families have also been bred nearly every where and have surpassed all foreign species in the experiments made. The most commonly grown species of potatoes are »Richter's imperator«, »Sutton's magnum bonum« and »Paulsen's July«. On the two or more yearly clover and grass-fields a seed mixture is sown consisting chiefly of red clover (on cloversick soil the common birds-feet-trefoil) alsike clover, white clover (a small amount), orchard grass, English and Italian rye grass, French rye grass, timothy and meadow fescue, in all 30 kg. per ha, about half of it legumens. For one yearly use of the pasture is always sown, besides red clover, common kidney vetch, lucerne (alfalfa), common and Italian ryegrass and field brome grass in all 20 to 24 kg per ha. In the later years considerable culture of root seeds and grasseeds has been carried on, on a rational basis under strict control and with a close attention to the experiment results. While Denmark imported nearly all of its seed supply a few years ago, there is now exported a considerable quantity.

The Sowing. On the southern islands, the spring sowing commences normally at the end of March and in northern and western Jutland two or three weeks later; taking the country as a whole say about 10 days into April. The sugarbeets are sown about the middle of April, the beetroots about May 1st, the rutabaga one or two weeks later and turnips at the end of May or beginning of June. The potatoes are generally planted about May 1st The wheat is normally sown in the third week of September, the rye from the end of August to September, latest on the rich soils in the mildest districts of the country. The amount of seed used is, of all four grains, usually 160 to 199 kg per ha. Of sugar beets are sown about 25 kg, of beetroots 15 to 20 kg, of rutabaga and turnips 4 to 5 kg, all per ha. On about 40,000 farms the grains are sown with machines and about half of these are drills, chiefly on larger farms. The distance between the rows is usually 10 to 15 cm, but experimentally a distance of 20 to 24 cm with hoes between the drills have lately been tried. The sugarbeets are sown with a distance of, at least, 40 and, at most, 50 cm, the beetroots and turnips with 50 to 60 cm, the rutabaga with 60 to 75 cm and the potatoes with 60 to 65 cm between the rows. Seed drills of Danish manufacture are increasingly supplanting the imported ones.

The Harvest. The field hay is cut in the latter half of June, the meadow hay one or two weeks later. The hay lies 1 or 2 days in the swaths after cutting, after which it is collected in cocks and 4 to 8 days later hauled to the barn. Winter barley is harvested in the middle of July or earlier, rye and six rowed barley at the end of July or beginning of August and oats — as a rule — a little later. On low cold soils and in a great part of Jutland, the harvest time is, on an average, somewhat later than mentioned above. In the main the harvest is normally finished a little before the middle of September, not seldom in the beginning of that month. The grain is, as a rule, tied in sheafs, after cutting, which are stacked in pairs in long shocks and left till dry. Often however the sheafs are stacked at once after cutting or when half dry in so called Bornholm stacks of 30 to 100 sheafs each; by this system the grain is well protected against the very uncertain weather which prevails in the month of August. Mowing machines are used on about 50,000 farms and there are some 30,000 reapers of which 10,000 are selfbinders. The potato digging takes place chiefly in September and the hauling and storing of the root crops lasts all through October and is generally finished at the end of that month.

The Harvest yield and it's value is published annually by the statistical bureau on the basis of reports from every county. When all the more important harvest products are converted, according to a uniform system, to 50 kg grain and this, or the corresponding amount of roots, potatoes, hay and straw, is called a »harvest unit«, then the harvest of the whole country has been as follows.

Annual yearly average of »Harvest units«.

1875	to 79	56	Million
1885	89	67	—
1895	99	77	—
1905	09	99	—
1910	12	107	—

To this must be added the value of soiling crops and pastures, which now may be estimated at about 30 million »harvest-units« anually.

The explanation why the harvest has been doubled in barely 40 years must be sought partly in an extension of the cultivated area by the cultivation of heaths and moors, drainage of lakes etc., partly by a continuous increasing yield from the total harvest area (cultivated fields and meadows) which in 1875 was ca. 1.5 million ha and in 1912 ca. 2 million. The yield per ha was, in 1875, about 21 »harvest-units« and, in

1912, about 38. This increase in yield per ha may be explained by the increasing dairy and livestock industry with the consequent increased manure production, by the more careful preservation and application of the barnyard manure, by an increased use of commercial fertilizers, by an improved rotation and soil cultivation, by the introduction of more valuable cultured plants and by timely sowing and fighting weeds and plant diseases.

Literature:
»Tidskrift for Landbrugets Planteavl«.
Statistisk Tabelværk. Femte Række. Litra C. N. 4. 1911.

The Horse Breeding.

Even in the middle ages Denmark was renowned for it's horses which formed one of the greatest sources of the country's income, and it was then — as it is now — Jutland which was the most important breeding district inasmuch as a relatively large and heavy country horse was raised in the most fertile districts of that province, chiefly for export to Germany. The country horses on Seeland were small and poor and those on Fyn were about between the two.

But, besides these country horses, there were, in the age of chivalry, studs of foreign or mixed breeds for the raising of saddle horses in war and peace (among which war horses) on the crown's, the noblemens' and the cloisters' estates. In the 15th to 16th century, after the invention of gunpowder, this horse breeding partly lost it's importance, and when — after the reformation — the cloister estates were sequestered as crown properties, the Kings gradually consolidated the numerous small studs on Seeland, notably at Esrom and Frederiksborg, where an important court-stud was organized which became world renowned in the 17th and 18th century. At the same time the estate studs were reduced in numbers as unprofitable, and the country horse breeding also stagnated owing to the oppressed conditions of the peasants. Yet the stock of horses in the vicinity of the studfarm was crossed with the Royal stallions, while in Jutland it was maintained as a paying export business, but little affected by foreign blood. The old stud at Frederiksborg itself degenerated and was very much spoiled by different crossings in the first half of the 19th century and was abolished in 1840 after which it was run exclusively as a thoroughbred stud for some years, but later it was made a halfbred stud of the old breed and was finally abandoned in 1876. From 1830 farmers had been allowed to have their mares served by the best stud stallions and from that time the horses in northern Seeland have been greatly improved, and, as the best stallions remained in the locality when the stud was disbanded, it's direct influence has reached over a hundred years. Since then, to be sure, new blood has been imported to the Frederiksborg district, but it has not had any permanent influence while the blood from the best horses in the stud has preserved it's vitality and is now kept pure. The present Frederiksborg horse is a beautiful light horse, it resembles some what the English hackney. The breed has spread over Seeland and Bornholm but the breeding is at it's best in Frederiksborg district which is it's center.

The heavy country horse has yet it's headquarters in the best districts of Jutland and for 50 years it has been well cared for and kept pure, but, during the last 25 years, it has also been favored epecially in every way by the conditions. It has also responded to this and developed in the desired direction namely to a relatively large and attractive appearing workhorse. This has been made possible by the improved farming which has permitted better care in it's raising. The Jutland horse is now predominent both on Fyn and Laaland-Falster.

But, besides these two national breeds there is on the islands, especially Seeland, some crossbreeding practised, just as in Fyn and notably Seeland there is some crossbreeding with foreign stallions of respectively Belgian and Oldenburg breed.

The stock of horses in the country was, in 1909, 535,000 heads, of which 242,000 were on the islands and 292,000 in Jutland. About 400,000 of the total number were over 3 years old and thus able to work. The number of foals born was about 19,000 on the islands and 35,000 in Jutland. According to the number of mares served by the stallions of the various breeds, the proportion is about thus: 78.5 % by Jutland, 9.3 % by Frederiksborg and 12.2 % by mixed or foreign stallions. But as these also served mares of mixed breeds or one of the two national breeds, the relative figure for these should possibly be put a little higher.

The export consists chiefly of horses of the Jutland breed and has averaged about 24,000 heads annually during this century, in which to be sure is included one or two thousand foals and a few hundred imported Swedish horses. The average price for fullgrown horses is, according to the statistical bureau, about 700 Kr. The horses go nearly exclusively to Germany.

The government offers considerable aid to the breeding of horses, thus 40,000 Kr. annually for premiums at the shows for stallions over 4 years old. Premiums for young stallions and mares are offered at the agricultural societies' shows to which the government contributes one half, and besides this a state subsidy is given, to the horse breeding associations, up to 2000 Kr. per stallion for keeping them. Of such associations there are about 280 with 300 stallions. Since 1886 a studbook has been kept, by the respective State experts for horses of the Jutland breed and since 1897 also one for the horses of the lighter breeds including that of Frederiksborg horses.

Literature: J. Jensen »Det kongelige Frederiksborgske Stutteri's Historie«.. Copenhagen 1910 (324 pagn.)

The Red Danish Dairy Breed.

This breed is at home on the Danish islands and is also scattered over the southern part of Jutland. About half the cattle in the country belong to this breed.

It is thus very predominant in Denmark and also commenses to gain a standing outside the boundary of the country notably in Russia. Scattered it may also be found in more distant countries, single individuals have been sent as far as Australia. An official emissary from that country reported that the Danish cattle which got there had developed well and gave satisfaction, to which he added that it was desirable if Australia could receive a larger supply. — Several prominent agriculturists from Canada, who have visited Denmark during the later years, have also spoken in favor of an importation of red Danish dairy cattle to the best Canadian dairy districts.

The red Danish dairy breed thus begins to draw attention beyond the boundaries of the country and hence a short description of it's history is in order. The condition then obtains that the red Danish dairy breed, like all other breeds, was not originally created in it's present shape and with the qualities which now characterize it; it has developed gradually and continues to develop.

The stock of cattle, in the middle of the 19th century, on the Danish islands, where the red Danish dairy breed is now found on the large majority of farms, was an old native breed characterized particularily by it's contentment and it's ability to produce a large quantity of milk in proportion to the feed given it. It was however poorly fed; the summer pasture was it's good season, in winter it lived on straw and a little hay. It was bred early — even at the age of 2 years, and the best milkers were used for breeding. Hence the breed was small, grown cows weighed 350 Kg. or less and it was not especially well built. Most of the cows were light red or redbrindled, some black or black spotted. It is easily understood that the cattle industry did not play a great role at that time; graingrowing and grainselling was the speciality of the islanders. But, about the year 1850, a change took place in the working of the farms owing to various causes. Many ceased selling grain and sold butter — the islanders became cattlemen. This change came on gradually as it became profitable. The owners of the large estates started. In the 60ths and 70ths the best owners of smaller farms took hold. But it was not until the middle of the 80ths, when the co-operative creameries were organized and spread with a fabulous speed, that the movement became general. Then all farmers could produce milk at a profit.

This change in the husbandry commenced by a heavier feeding; more concentrates were used and the animals received better care, both the milchcows and the young stock. The next was breed improvement, which was a natural sequence to the experience that the old contented native breed did not pay for the better feed given.

The help was drawn from the best developed dairybreeds in Slesvig, the Angler cattle, the North-Slesvig cattle and the (now extinct) Ballum cattle. Many of the large estates on the islands bought cattle of these red breeds, and it proved a profitable enterprise. These breeds throve well under the new conditions. Our climate was familiar, they had been bred for many generations, under similar conditions to those offered by us, only a few kilometers from the Danish islands, and their milk yielding capacity was so pronounced that they could be offered heavier rations than those to which the Danish cattle were accustomed.

The said Slesvig cattle were also suitable in another way for the improvement, as they nicked particularily well with the original native breed on the islands. It's superior prepotency showed itself, as for instance, in that the calves, even with brindled cows, were generally red. The improving material had — in other words — the same basic character as the native breed, it did not differ essentially from it, only the improving elements had been cultivated more. The good qualities of the Slesvig cows soon became known, and many calves of both sexes were sold from the larger estates to the smaller farms. Gradually pure herds of Slesvig origin were built up both on the large and small farms, especially herds of Angler cattle, and North Slesvig cattle as well as crosses between these or crosses between them and the Ballum breed. From these herds of pure red dairy cattle and by further supplies of cattle from Slesvig, all the Danish cattle were gradually leavened or replaced on the islands, with Slesvig cattle. As early as 1870 there were several important families and herds of the above mentioned breeds. —

As regards the selection of the foundation stock both milk-yield and form of body have constantly been considered. Sometimes, and, especially in certain localities, the Angler type has been preferred, but gradually the demands grew both as to size and harmony of the frame. The fat percentage in the milk has been considered especially in the choice of the bull's mothers since the close of the 19th century.

Under these conditions the old island breed disappeared rather quickly, and the red Danish dairy breed was founded.

As the name indicates this breed is red, as a rule dark red without any conspicuous marks. White spots under the belly and on the udder are however not uncommon. The muzzle is slate colored. The cows weigh 450 to 550 Kg. The type is that of dairy cattle, the frame is fairly harmonious and the structure rather fine. The udder is very well developed with sufficiently large and generally well placed teats.

The power of transmitting type, milking capacity and color is generally reliable. During the last 25 years the breed has nearly exclusively been maintained by home breeding and, in the same period, the uniformity and the harmonious body frame has been improved greatly while the milk yield has been increased considerably. —

The milkyield proper depends, of course, much on the amount and quality of the feed, as well as the care, given the animals. Perhaps the best way to indicate the yield of the breed is to state that 40,000 cows of this breed on the island of Fyn produced, according to the report 1909—10 of the control (cow testing) associations, on an average 3,387 Kg. milk with 3.49 % fat, which corresponds to 132 Kg. butter, and that 38,000 cows belonging to more than 2700 herds of the red Danish dairy breed on Fyn averaged, in 1910—11, 3,550 Kg. milk with 3.53 % fat, corresponding to 140 Kg. butter.

These are, however, not the figures of the kind usually published, when the capacity of a breed is mentioned. As a rule it is then only the yield of prominent herds or more often that of single prominent individuals, which is mentioned. Hence I supplement the above records with the information, that all the milch cows in 11 Fyn herds, which in 1909 to 11 participated in the two-yearly competition of whole herds, averaged 4,112 Kg. milk, testing 3.65 % fat, corresponding to 167 Kg. butter. One of these herds averaged 4,442 Kg.s milk, testing 3.73 % fat, making 186 Kg. butter, and another averaged 4,334 Kg. milk with 3.72 % fat or 180 Kg. butter, both of which herds received the highest award.

If we take up the yield of single individuals of this breed, it may, of course, be higher still. It is thus not uncommon that a fullgrown cow yields 5,000 Kg. milk and in single instances the yield rises to 6,500 Kg., in one to 7,500 Kg. milk. —

The average fat percentage of the milk is about 3.5 %, but it is increasing within the breed. There are many examples of the milk, from large yielding cows, averaging annually 4 % fat or more. Such cows are preferred as dams for bulls, if they otherwise are well shaped and belong to a good family.

In all cultured breeds, thus also in the red Danish dairy breed, there are among the great mass of common good useable herds, single ones (and indeed not so very few) consisting of prominent breeding animals. It is from these herds — »breeding centers« — that the distribution of breeding bulls particularly takes place. Any one, visiting the country, will find it easy to get assistance in finding these breeding centers and, when these are visited, further guidance will be found in the there existing family herd books, which are kept under official control.

If it is desired to go further into the details of the history of the breed and it's present standing, several sources may be found in the following literature:

Det kgl. danske Landhusholdningsselskabs Landboskrifter:

3. Bind, Kvægbrugets Udvikling i Danmark, særlig i Sorø og Præstø Amter af Harald Goldschmidt.

2. Bind, Kvægbrugets Udvikling i Danmark, særlig paa Fyn og Lolland-Falster af A. Appel og P. A. Mørkeberg.

J. Fisker: Kvægavlsarbejdet og Kvægavlen i Københavns Amt.

R. Jensen og K. M. Jensen: Kvægbrugets Udvikling i Holbæk Amt.

W. Saxtorph: Kvæget i Frederiksborg Amt.

Landbrugsministeriet: Avlscenterberetning I og II.

De samvirkende fynske Ldf.: Beretninger om Konkurrencer mellem hele Kvæghold I—VII.

De samvirkende sjællandske Ldf.: Beretninger om Konkurrencer mellem hele Kvæghold I—III.

De samv. danske Ldf.s Stambog for Tyre af rød dansk Mælkerace I—XVI. Udarbejdet af P. A. Mørkeberg.

De samv. fynske Ldf. Kostambog I—IV. Udarbejdet af H. B. Koch.

De samv. sjæll. Ldf. Kostambog I—II. Udarbejdet af J. Fisker.

Aarsberetninger om Kontrolforeninger paa Fyn, Sjælland og Lolland-Falster.

The Jutland Dairy Cattle.

Origin and Distribution. The Jutland breed is an old national breed, probably of the same origin as the Dutch cattle and the Brittany cattle being similar in color. It forms the mainbody of the cattle on the North-Jutland peninsula. The Holland and Holstein people have since olden days, appreciated the Jutland cattle for its juicy marbled beef.

Improving the Breed. This was a thriving, hardy and easily contented country breed not developed in any special direction. But time has changed it. The strong development of the dairy industry, in the last decades, has caused the Jutland cattle to be developed into a large yielding milk breed, retaining its fine symmetrical build. The victorious progress of the co-operative creameries in the Danish dairy industry has been a powerful factor in this. It has influenced the selection of breeding stock and promoted a more liberal, better and more uniform feeding of the cattle. As active agencies in improving the Jutland milkbreed must be mentioned the stock shows, the foundation and publication of herdbooks, the organizing of numerous breeders- and »control«-associations, (cowtesting) as well as the competitions between whole herds, all with partial State subsidies. —

Characteristics of the Breed. The color is black and white, a small minority are grey or fawn-colored.

The frame is deep and wide, the chest deep and the belly capacious. The milking indications are prominent and the milk organs well developed. The udder is of a fine rounded shape. The hide is soft. The Jutland cow is a thriving cow with good digestive powers, vigorous, a persistent milker and valuable when disposed of to the butcher. —

Weight. The Jutland cattle is of medium size, the average weight of the eastern Jutland dairy cows is 450 to 500 kg., in the poorer districts of central Jutland 350 to 400 kg. Large cows when fat reach 600 to 700 kg., bulls 900 to 1200 kg. when fattened. —

Yield. The milk yield varies, of course, according to the family, the individual and the feeding. The average yield in 185 cowtesting associations with 65,000 cows (chiefly of Jutland breed) was, in 1911—12, 3000 kg. milk (exactly 2989 kg.) and 117 kg. butter per cow. The fat percentage was 3.52. The association averages varied from 3600 kg. milk and 142 kg. butter to 2400 and 83. Six of the herds of Jutland breed, receiving the highest awards in the cattle competitions 1905—07, had a two yearly average for all cows and heifers of 4105 kg. milk and 170 kg. butter, the fat percentage being 3.70. Single herds yield over 4500 kg. milk and about 200 kg. butter, just as the fat percentage of herds reaches 4.2. Individual cows reach now and then above 6000 kg. with a fat percentage of 4.5 or more.

The official herdbook for bulls of the Jutland breed contains 1914 numbers in 20 volumes, the first being published in 1889. —

Literature:

Danmarks Landbrug. S. 252. »Det jydske Malkekvæg« ved Statskonsulent Axel Appel.

Landbrugets Ordbog. (Det jydske Kvæg. Af Statskonsulent Axel Appel).

Landmandsbogen, 2. Bind, Pag. 245. (Ved Statskonsulent Axel Appel).

Sur l'agriculture de Dannemark. Pag. 162—180 af A. Appel.

Det jydske Kvægbrugs Historie af H. Clausager.

The Shorthorn Cattle.

This breed has spread from the west coast of Slesvig through Ribe and made itself at home in the southwestern and partly the western and northwestern districts, in Ribe, Ringkøbing and Thisted districts (Amter) just as it is also found — yet few in numbers and scattered — in the other districts of Jutland. The main center is in Ribe district. Of the 20462 bulls (1909) 3749 were of the Shorthorn breed. By frequent importations and use of Shorthorn bulls the local breed has, by consistent crossings, been bred up to the Shorthorns. This was started about the middle of the 19th century by importation of bulls from Slesvig marshes to Ribe district.

On Henneberg Ladegaard near Fredericia, H. F. Hansen founded in 1869 the later on well known and excellent herd of Shorthorns from which, through many years, a large number of bulls were sold, promoting the breeding of Shorthorns notably in the Ribe district, where the cattle are strongly impressed by the blood from Henneberg Ladegaard.

Since 1904 the breeding of Shorthorns has been greatly increased in the southwestern Jutland by the establishing of numerous breeding associations which, in the main, have secured good, frequently excellent bulls, chiefly imported from Ejdersted (Slesvig), now and then from England. In spite of the evident improvement in the frame and uniformity of the Shorthorn stock, its breeding can not as yet be carried on independently but there is need of renewed blood. In intensive cattle breeding districts the Shorthorn is appreciated for its quick growth, early maturity and good frame, but, at the same time, a good milk production is also demanded of the cows and is obtained in several instances. The official herdbook for bulls of the Shorthorn breed contains 247 numbers in 3 volumes, the first being published in 1906. —

Literature:

Landbrugets Ordbog.

De samvirkende danske Landboforeningers Stambog over Tyre af Korthornsracen. (Volume I).

Det jydske Kvægbrugs Historie af H. Clausager.

The Swine Industry.

The swine industry is conducted with the aim of building up a Danish native breed, which should satisfy the demands of the farmers for thriftiness, prolificness and hardiness as well as that of the market as regards the quality of the bacon. And, as England absorbs more than 90 % of our export product, we are considering the demands of that market exclusively. We try to produce a long, fleshy, fineboned and fineskinned swine with the back and belly muscles especially well developed and with good hams.

As the Danish native breed of pigs is at present it satisfies most of the above demands, and our National breed reaches the weight which is most suitable for the English market — 90 to 100 Kg. live weight — at an age of 6 to 8 months when properly cared for. If the development is forced the weight may be reached in still shorter time.

But in some regards our native breed is yet behind, namely as regards the development of the belly muscles and of the hams as well as the fineness of the bone structure and of the skin. Yet, even in these regards, the Danish breed is pretty fair and is perceptibly improving.

However we secure a product, which is more suitable for the English market when we cross sows of the native breed with boars of the large white improved English breed. The progeny of this cross retains the thriftiness of the pure Danish native breed, as the above mentioned weights are obtained at the same age — 6 to 8 months — with good care, while co-incidentally the bacon is of a finer quality. And the progeny of the native sow is, as a rule, just as numerous and hardy, whether it is bred from a boar of the native breed or one of the Yorkshire breed. To this must be added, that the cross, as a rule, yields a couple of percent more export bacon than the pure native breed.

For this reason we have, as yet, two swinebreeds in the country, the native and the large Yorkshire breed.

The Danish native pig grows fast, is large and long with longsnouted head, large broad, as rule, heavy drooping ears, light medium long neck, rather light shoulders, long deep, not seldom somewhat flat body with a strong and slightly curved back, thick and well let down flank, rather broad, often a little drooping, hindquarter, more or less good hams and powerful well formed limbs. The native sows are distinguished as being very prolific and yielding a large amount of milk. The udder is large while suckling and has, as a rule, not less than 12 teats often 14 to 16. She is a very careful mother especially when young. By 9000 partituritions of native sows, in the period 1903 to 1911, there were born a yearly average of from 10.6 to 11.4 pigs per litter, of which 8.3 to 8.6 were present at weaning time. As a rule the native sow farrows twice a year often five times in two years. Hence one may figure on 17 to 20 viable pigs annually per sow. It is advisable to let her farrow the first time when 12 month old, but the sow often has her first litter when 9 or 10 months old. The Danish native swine is nearly always white, seldom blackspotted, the hair coat is thick but not especially coarse.

The Yorkshire Breed, which originated in England and is found distributed over large areas of the world, I deem well known.

The systematic work for the formation and development of the Danish native breed of pigs commenced about 1895 by attempting to collect the best boars and sows of this breed at the farms of a few interested swine breeders who then kept them pure. The number of these breeders has gradually increased considerably and are found spread over all the Danish provinces. Many of them have worked so ably and successfully, that their herds have gradually assumed a uniform and pleasing exterior, great breeding value — considerable prepotency. Such herds we call breeding centers (Avlscentrer) and from these are distributed as many breeding animals as possible.

If the said successful and expert swinebreeders desire to get their name and activity known in wider circles, they apply to the local baconfactory, which then, through a committee especially appointed for this purpose, controls the herd. All the breeding animals are »selected« and branded and the progeny are marked in the ears with the number of their mother, after which the owner keeps a record of the service, the descent and the sales. Those herds, which in this manner are brought under systematic breeding, are inspected once a year by a committee appointed by the government and the united co-operative bacon factories, and if this committee deems the herd good enough, it is recorded as a »state approved breeding center«. There are now 82 such state approved breeding centers for swine of the native breed.

The breeding of the large Yorkshire breed is managed in a similar manner and we have, at the present time, 22 such state approved breeding centers for that breed. The progenitors in these Yorkshire centers are all absolutely »purebred« inasmuch as the original progenitors are brought from the mother centers in England. Hence the pedigrees may all be traced back to the English herdbook for the large Yorkshire breed.

In the selection of the breeding animals in the centers, considerable stress is laid on the thriftiness and the quality of the bacon. These are characteristics which may not be valued exactly at sight, and hence the supervision of the swinebreeding centers is supported by the Royal experiment laboratory. Experiments with the progeny of the breeding animals in the swinebreeding centers are made at 3 experiment farms. The results of these experiments guide the selection of new breeding animals. Details as to these experiments are found in the reports of the experiment laboratory which thus contain valuable information about the thrift and quality of the Danish swine.

I must further mention that the swinebreeding is also guided through the local livestock shows, where swine may be shown by the members of all the agricultural societies. Here the swine are divided into the two main groups, which have been discussed above — the native breed and the Yorkshire breed — and each of these groups is judged separately. At the larger stock shows one may easily form an opinion as to the appearance and breeds of the Danish swine.

Those who desire further information as to the history of the swinebreeding and swine industry may look up the following modern Danish literature:

Tidskrift for Landøkonomi. Aargang 1896. Konsulentberetningerne, udgivne af Landbrugsministeriet.

Om Svineavlens Ledelse i Danmark af P. A. Mørkeberg. Udgivet 1901 af Det Kgl. danske Landhusholdningsselskab.

Svinets Røgt og Pleje af N. Beck og P. Gommesen. 1904 do. do.

Stambog for Orner af dansk Landraee, B. I—IV, udgivet af De samvirkende danske Landboforeninger.

Forsøgslaboratoriets 64de, 67de, 75de, 79de og 80de Beretning.

The Sheep Industry.

The sheep industry now plays but a small role in comparison with the cattle industry against what it did fifty years ago, but is still of greatest importance in Jutland. From 1881 to 1890 we averaged a yearly surplus export of 58,000 live sheep and in the year 1882—83 we exported 104,000. This export was stopped by the English and German importation prohibitions in 1892 and 1893 respectively. The improvement of the native-(»land«) and heath-sheep was commenced as early as the 16th century (by English, Polish and Podolian sheep) but with poor results. The breeding of merinos was tried from the close of the 18th to far into the 19th with State aid, but neither had this any great influence on the native breed.

In the latter part of the 19th century with improved agriculture came the need of a larger and heavier sheep — a mutton sheep — and we got the improving stock from England, at first the Dishley and Southdown breeds, later notably the Oxford Downs. The sheep stock is now — excepting a few secluded heath localities — plainly marked by the English breeds and by better care and feeding. The reduction in numbers is concurrent with an improved quality, even if it is yet poor in many localities on account of aimless breeding and poor feeding. —

In the last decade, since 1902, several sheep breeding associations have been organized most of which are in Jutland. These associations are provided in no small degree with purebred rams from our breeding centers for pure Oxford Downs and Leicesters, and through this is secured a very considerable improvement in the sheep stock which is evident in the said localities. Of our prominent flocks, the Oxford Downs at Haverslev (near Arden) and at Bygholm (near Horsens) must be mentioned among the smaller, as well as Näsgaard (near Stubbekøbing) and Eskemosegaard (near Birkerød) among the larger flocks, and, of Leicester sheep, Børkopgaard (near Børkop).

From these centers is not only sent a lot of excellent breeding animals to sheepbreeding associations and individual breeders at home, but also to foreign countries (Sweden, Norway, Slesvig and Russia). First class ewes in the best flocks reach a weight of 125 kg., rams 150 to 175 kg., ram lambs 10 months old 90 kg. and ewe lambs 75 kg. The official flockbook for rams of the Oxford Downs and Leicester breeds contain 191 and 69 numbers and is issued in two volumes, the first one published in 1908. —

Litterature:

Faareavl og Faarehold ved A. Appel.

Faareavlen i Danmark i »Danmarks Landbrug«, S. 262 ved Statskonsulent Axel Appel.

Landbrugets Ordbog. (Faareholdet i Danmark. Af Statskonsulent Axel Appel).

Poultry Raising.

Poultry raising has, during the last two decades, developed enormously. The egg export is the fourth largests of the agricultural products and there are, as yet, great opportunities for further development especially on the small farms where there is kept the most poultry in proportion to area. The small flocks pay well but it is difficult with the very large ones. — Often poultry raising is combined with orcharding. The egg production is the main object and in but few localities is fattening and winter-chicken breeding practised. The existing poultry fattening establishments are catering to the home market exclusively.

Of the various breeds, the Leghorns and Minorcas have left good impressions on the predominant mixed breeds, but Plymouth Rocks, Wyandottes and Orpingtons are also gaining a good foothold. Artificial incubation and raising is used even if not very extensively so. The raising of geese is disminishing owing to a better utilization of the soil. Duckbreeding is difficult to make profitable where quick circulation and cheap feeding does not exist. Turkey raising is practised mostly on the large farms and pigeons are generally the object of fanciers only.

At first the creameries collected eggs and later egg collecting »circles« (local associations) were organized in which however no more than one third of our 288,000 poultry flocks are entered. The Danish co-operative egg export association, organized in 1895, has established a very creditable reform by it's careful system of collecting and stamping the eggs. The eggs are bought from the producers by the egg collector (who generally drives a team) and shipped from the »circle« to the various packing houses*) of the association, where they are candled, graded and packed. Each member stamps his eggs with his number and that of the »circle« to which he belongs, so that fines may be imposed on those who deliver stale eggs. Besides this some of the co-operative bacon factories and some merchants export eggs of which the 15 ℔ sortings**) are much in demand. One quarter of the production is preserved when the eggs are cheap; they are stored in large cement tanks as a rule filled with limewater with an addition of gypsum.

In 1865 the net export was 0.035 million scores, in 1885 — 3.5 million, in 1905 about 17.25, in 1911 it was 21.5 and in 1912 fully 19 million scores; besides this a large home demand was supplied. — The chief market is northern and central England and only 5 % of our export goes to foreign countries, notably Germany and Sweden. The export of poultry is hardly worth mentioning. In 1888 there were 4,592,200 chickens, 32,200 turkeys, 643,900 ducks and 213,500 geese and in 1903 there were 11,815,783 chickens, 45,771 turkeys, 791,797 ducks and 119,412 geese.

There is a poultry breeder's association covering the whole country with district (amts) associations, which chiefly work for organizing exhibitions and the publishing of an association journal. Furthermore several small holder's- and agricultural associations as well as the Danish co-operative egg export associations have taken up the practical plan of promoting the poultry breeding by establishing breeding centers and by giving premiums for the best managed and paying flocks etc. The main stress is laid on the control of the individual yield, the marking of the chicks and the keeping of a flock register. In 1903 a poultry clinic was established at the veterinary school and the experiment laboratory is making sundry poultry experiments. Since January 1913 the Royal Danish agricultural society has appointed a counselor in poultry breeding who travels all over the country to lecture and to give practical advice both to associations and to individual breeders.

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*) In Copenhagen, Ringsted, Odense, Rudkøbing, Nykøbing F., Aalborg, Aarhus, Esbjerg, Veile and Neksø.

**) The eggs are sorted according to size from 13 to 18 lbs per 120 and packed in cases of 1440.

Literature:

Fjerkræavlens Standpunkt i Nordeuropa med særligt Henblik paa Fedning af Fjerkræ samt Opdræt af Vinterkyllinger af Konsulent W. A. Kock.

Report On The Second National Poultry Conference, Reading 1907 »Co-operation in relation to marketing in Denmark« by W. A. Kock (Queen Annès Chambers Westminster, London S. W.).

»Co-operative marketing of Eggs in Denmark« U. S. Consular Report in New York Produce Review vol XVIII, page 742. (1904).

»Co-operative Marketing of Eggs« (illustrated) by J. H. Monrad. N. Y. P. R. vol XXIV, page 1042. (1908).

Checking Contagious Diseases in Domestic Animals.

The provisions for checking contagious diseases in domestic animals in Denmark are contained in the act of April 14th 1893 and the corresponding directions for the veterinary police of August 24th 1894 with later additions and changes. In the said act there are rules fixed for the public treatment of contagious diseases — quarantaining of the infected animals and herds as well as quarantaining of larger or smaller districts under certain conditions, disinfection etc. etc. — and furthermore authority is given the agricultural department to take the necessary steps for the prevention of contagious diseases by importation of domestic animals as well as their products from foreign countries. According to this authorization, sundry proclamations have been issued of which that of June 13th 1896 must be mentioned as the most important. In this proclamation it was decreed, all according to the greater or less danger feared of infection being introduced by certain domestic animals from the country in question, 1) »general prohibition«, 2) »limited prohibition«, 3) »temporary quarantaining at the place of destination« or 4) only »sanitary inspection at the place of arrival«.

In the proclamation of June 30th 1899, it is stated which countries — »until further notice« — are comprised under this or that rule as regards the domestic animals in question.

The importation of ruminants and swine is, at present, only permitted from Sweden and Norway and, as applying to live cattle, only on condition that the animal pass a tuberculin test made at the place of importation.

As regards the fight against tuberculosis in cattle, it has been decided by law since 1898 (now law of Febr 5th 1904) that the cows suffering from udder tuberculosis must be killed under public direction and it is ordained that the skimmed milk and buttermilk, used for feeding animals, must be pasteurized (heated to 80° centigrade) before it is returned from the creameries to the milk suppliers. Furthermore an appropriation of up to 100,000 Kr. annually is granted to the owners of cattle who desire to use the tuberculin test in fighting tuberculosis in cattle by the isolation system.*)

By law of Febr. 25th 1876, as amended April 12th 1911, the Danish government is authorized to promulgate rules for preventing the export from Denmark of domestic animals which are even suspected of being infected with contagious diseases, as well as products of domestic animals, also hay, straw and other materials by which contagious diseases may be spread. In this connection — under a decree of April 24th 1896 — veterinary inspection has been ordained of cattle, sheep, goats and swine before shipment to foreign countries, and the veterinary must turn off evidently diseased animals and very emaciated and wretched animals, the appearance of which makes it probable that they suffer from some chronic wasting disease, just as he must refuse health certificate in all cases, where the animals present sickly conditions which in themselves might justify the presumption of any malignant contagious disease, or which may — in reason — be feared to cause a suspicion in the foreign country.

A law was enacted April 1903 and superseded by act of May 27th 1908 regarding the control of meat export etc. etc. and all the export slaughterhouses in Denmark are, since then, under a strict veterinary control, aiming, in every case, to prevent the export of meat and slaughterhouse by-products which are unfit for human consumption, and besides conforming to rules which agree with the sanitary demands by the meat importing countries in question. It is, as for instance, ordained that slaughtered swine, which, under the control, prove to have been even in ever so small degree tuberculous, must not be exported to Great Britain.

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*) Known as the Bang System.

The Dairy Industry.

The Dairy industry in Denmark is in reality not very old. Up to about 1830—50, farmers doubted whether dairying paid or not. After 1850 the dairy industry increased more and more and the larger estates took the lead and showed — by experiments and practical measures — that dairying paid. There was no great export, partly because the butter had not yet gained a reputation on the world's market and partly because they could not make a uniform product as the many small batches made on the small farms were of a very uneven quality.

Segelcke (1831—1902) contributed very much to the rapid development of the Danish dairy industry. He put in an enormous amount of work as the counselor of the Royal agricultural society, in order to establish a regular and systematic dairy industry. He impressed his ideas everywhere by training and appointing dairy counselors, and made the farmers understand that by proper and intelligent work a good profit could be made by dairying.

At the London exposition in 1879 the Danish butter conquered in the international competition and this result was due chiefly to the purposeful work of Segelcke.

Since the introduction of the separator the work was further systematized and when the first co-operative creameries were started, the small farmer, with one or only a few cows received as much for his milk and became of the same importance as the estate owner with the many cows, and, when the farmers realized this, one co-operative creamery after another was erected. That this novement in favor of co-operative creameries became so phenomenal was surely also due to the fact that the creameries were built very cheaply and hence the farmers were not scared by any great outlays as it must be remembered that they were not accustomed to have much cash in hand.

This development may best be outlined by the following figures: in 1882 the first co-operative creamery was erected (while the first individual one was started in 1863) and up to 1886 there were erected 86, from 1891—95 it was 169, from 1896—1900 it was 119. The total number in 1913 was 1188 co-operative and 300 individual or estate creameries and hence the total may now be put at fully 1500.

In 1909 there were reported 182,373 herds with 1,281,974 cows and of these 154,602 herds with 1,059,359 cows which supplied milk to the co-operative creameries. The following table show the support of the co-operative creameries given by the farms according to size.

			Herds	Cows
Up to 0.55 ha			70.1 %	67.5 %
From	0.55 to	4.96 ha...	84.9 —	86.3 —
—	4.96	14.89 - ...	88.1 —	88.9 —
—	14.89	29.79 ...	90.3 —	90.8 —
—	29.79	59.57 ...	88.9 —	88.0 —
—	59.57	238.30 ...	82.8 —	73.9 —
Above 238.3 ha............			49 0 —	38.8 —

The table shows that only half of the largest estates deliver milk to the co-operative creameries. They either make up the milk at home or contract it to the individual creameries or to the city dealers. The total milk production of the country may be placed at 3,500 million Kg. and of this about 2,700 million Kg. go to the co-operative creameries.

The payment for the milk to the members of the co-operative creameries is usually made by calculating the full value for the whole milk delivered and deducting the value of skimmed and butter-milk returned. This value is agreed on at the general meeting. The statements are made up weekly and the payments are made monthly. As a rule rather a large amount is left over at the end of the financial year, and this »surplus« is distributed according to the whole milk delivered. This surplus averages for the whole country about 15 % of the payments made to the suppliers. The total working expenses — besides milk hauling — averaged (1912) 8.89 Kr. per 1000 Kg., the milkhauling 3.43 Kr. There are, on an average, 156 suppliers and 956 cows per co-operative creamery and the cows average 2,520 Kg. milk (against 2,627 Kg. in 1911) delivered to the creamery. It took 25.5 lbs milk to make 1 lb butter and the whole milk netted (in 1912) 9.7 Øre per Kg. The salaries averaged for the same year 1.60 Kr., the fuel 1.04 Kr. (against 0.86 for 1911) and the maintenance of buildings and inventory as well as renewals 0.59 Kr. all per 1000 Kg. milk.

The co-operative creameries handled, on an average, fully 2.5 million Kg. milk annually. The fire insurance averages about 30,000 Kr. and the debts fully 15,000 Kr. per creamery.

Butter is mainly produced but some cheese is also made either from skimmed milk or from mixtures of skimmed milk and whole milk (10 %, 15 %, 25 % and 40 % seldom more, whole milk), yet the production is hardly much more than 15 million Kg. annually. There is also some cheese made from pasteurized milk and — at times — some casein. There is one milk condensing factory erected in 1907 in Nakskov.

While the butter export in the period 1865—69 averaged about 5 million Kg., it was in 1880—84 about 15 million Kg., in 1885—89 fully 25, in 1900—04 fully 85, 1905 made it 93, 1906 it was 92, 1907 it was 100, in 1908 and 1909 it topped with 102 million Kg., in 1910 it fell to 91 and in 1911 it was 92 million Kg.

This drop in the butter export during the last years is due to the great increase in the export of milk and cream, this amounted, in 1910 to 23.7 million Kg. and in 1911 to 30.45 million Kg. valued in 1910 at 11 million Kr. and in 1911 at about 15 million Kr. In 1909 the export of milk and cream was rather insignificant.

Of the exported butter, however, a part is foreign which is re-exported and this amounts to about 12 million Kg. while the total import was 15 to 16 million Kg. It should be noted that all foreign butter must be so marked whether consumed or exported.

The cheese import is, as a rule, about 0.75 million Kg., generally a little less, while the export is only about 0,2 million Kg. and thus of no consequence.

There is a law ordaining that all butter made for export must be made from pasteurized cream (at least 80 ° C) and it must not contain more than 16 % moisture, nor contain any other preservative than salt. The butter is exported in firkins (1 cwt. net.) with two »Lur« branded staves and the registered number of the creamery. The police and the margarine inspectors control the pasteurization and the experiment laboratory analyses the samples sent in by them.

In order to shortly designate the factors which have caused this strong growth of our dairy industry we must first mention Segelcke (1836—1897) and Fjord (1825—1891) whose pioneer work as director of the experiment laboratory has been of inestimable value, next the co-operative movement which united the milksuppilers, large as well as small, and made it possible to produce large and uniform lines of butter.

The appointment of dairy counselors who, by lectures and inspections of the creameries and by acting as judges at exhibitions, have done, and surely continue to do so, a great educational work, is also a factor of importance. Furthermore the expositions where the products are scored by the merchants, the counselors and the buttermakers jointly, are also of great educational value. We have essentially three kinds of exhibitions, namely:

1) The pail shows of which each locality arranges 6 to

9 annually. The butter is scored about 14 Days old and is ordered in without previous notice (surprise tests). The written judgement is returned to the creamery with the butter.

2) Provincial exhibitions which are made once a year in each of the three provinces Jutland, Fyn and Seeland-Lolland-Falster. At these the creameries know the time beforehand and hence they are in reality only a trial of what the buttermakers can do when put on their mettle. At the same time there is exhibited cheese and dairy machinery and supplies. Instructive lectures about the butter, cheese and machinery display are delivered and sometimes is added a popular instructive subject.

3) The Experiment Laboratory Butter Scorings, take, as a rule, place once a week and are — since January 1912—compulsory for every creamery desiring to use the »Lur« brand and thus produce export butter. The creamery, accepted for control, is obliged — without previous warning and on written or wired order — to send in immediately a firkin of their finished butter to be scored. The butter is scored, when 14 days old, by 9 judges (merchants, counselors and butter-makers) in three sets. If the butter from a creamery is of poor quality (under the proclamations by the agricultural department of Nvb. 18th 1911 and July 8te 1912) the right to use the »Lur« brand may be canceled until the production is again of good quality. If there is more than 16 % moisture in the butter the »Lur« brand on the firkin is at once obliterated and the butter may then only be sold at home as »waterbutter«.

Finally the milkscoring associations must be mentioned, their aim is to score the milk arriving at the creameries either by a special milk judge or by the manager. The milk is classified and, in many creameries, a little more than the average price is paid for the good and a little less for the poorer milk and the supplier is thus spurred on to deliver a better quality.

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Mælkeritidende.

Horticulture.

Market Gardening.

Just as horticulture in general has achieved the great importance it now enjoys from an insignificant start, evenso market gardening has only step by step attained it's present great value for the commonwealth.

It is to be regretted that we do not posess any complete report as to how many market gardens there were in the kingdom some 30 ar 40 years back, but from a census taken by the National Danish Gardener's Association of the number of market gardens, it appears that the number of hothouses in these gardens were far more than 3000, built at an expense of more than 5 million Kroner and covering an area of 2.5 million square feet which, with the 112.000 hotbed-sashes, make a total of glass covered area of more than 5 million square feet.

A completely new period in the history of the Danish market gardening commenced at the close of the 60ths, and new establishments appeared everywhere. The domestic culture increased in quantity and improved in quality, the export picked up, and large quantities of nursery products were exported to Sweden and Norway, evenso garden stuffs, notably rhubarbs, to Sweden; but a depression followed in the 80ths. —

Gradually however it improved again and, since the beginning of this century, the progress is greater than ever, many new cultures are tried, thus must be mentioned the wholesale culture of cut flowers, fruits and vegetables, the culture of lilies of the valley and especially seed culture, to a great extent, for export.

Even in the middle of the last century Danish cauliflower- and white cabbage-seed had a great reputation, but it was only when the seed trade was taken in hand by commercially trained gardeners, the breeding controlled and the best families given their own names, that the breeding of Danish seed gained any real headway and the export, especially to America, became very large. Of other export articles may be mentioned potted lilacs for forcing, lilies of the valley sprouts for forcing, cut flowers, notably carnations and roses, early forced fruits and vegetables to which must be added an export of white cabbages which in some years reached a value of 10 million Kg.

The home consumption of cut flowers, fruit and vegetables has grown enormously during the last 10 or 15 years. A comparison of the circulation on the Copenhagen wholesale market shows it to have been 2,234,965 Kroner in 1890 while in

1911 it was about 10,700,000 Kroner. — While the number of market waggons averaged 300 per day in 1890 it was 517 in 1908, and the increase in the provinces must undoubtedly be figured in the same proportion as in Copenhagen and on that basis we get a total circulation of the market gardens in the kingdom of about 26 million Kroner, not including the nursery and seed stock, nor the export not passed through the markets. This enormous growth has, as regards Copenhagen, led to the erection of a great many new hothouses some of them of a hitherto unprecedented size and the establishing of many new market gardens.

The main organization of the gardening profession is the National Danish Gardener's Association with about 2800 members, the organ of which is the Gardener's Journal (Gartner-Tidende).

Private Gardening.

The interest in gardening — the cultivation af a larger or smaller plot, which owners or renters of villas control — is growing more and more.

The colony garden movement, introduced from England, also contributes a good deal to the promotion of the inclination and taste for private gardening, just as the lately increasing balcony decoration with plants must be considered as promoting amateur horticulture.

Extensive private gardening obtained, some 150 to 200 years ago, on many of the Danish estates as well as at the Royal palaces, yet these private gardens gradually lost their importance and now a days the number of prominent estate gardens is very small while, on the other hand, amateur gardening (under which the gardenlike culture, by the small lot holders (Husmænd) and other poorer people, of their plots of land must be counted) has greatly increased and the societies which take care of the interests of the amateurs have done a great work especially in orcharding.

The Royal Danish Horticultural Society and the Associated Danish Gardening Societies, aggregating some 12,000 members, guide the amateur garden movement. —

Literature: »Danmarks Havebrug« af Prof. Alfr. Bruun.

Forestry and Heath Plantations.

The total wood covered area of Denmark was, according to the report of July 15th 1907 of the statistical bureau, 324,240 ha, which corresponds to 8.3 % of the country's total area. (The average forest percentage of Europe is 33). The districts with the most woodlands are Frederiksborg and Bornholm with respectively 15.2 % and 16.1 % of their area and those with the least are Hjørring and Thisted with 5.4 % and 5.9 %. Fiftyseven percent of the total woodland is found in Jutland and fortythree on the islands.

Foliferous trees cover most of the woodland, namely 139,560 ha while pinetrees cover about 134,044 ha. The most and the largest pine woods are found in Jutland especially in the central and western parts. The pine wood consists especially of red pine (picea excelsa) and mountain pine (pinus montana), chiefly red pine.

The foliferous woods are predominant on the islands and in southeastern Jutland. The beech trees predominate and cover cir. 108,118 ha. Next comes the oak with cir. 12,687 ha and other foliferous trees with cir. 18,755 ha. The oak is found most extensively on the southern islands and the beech on Sealand in the Sorö and Præstö districts.

The woodland area without trees comprised cir. 50,500 ha and of these about 32,545 ha have been planted. Of the total wood-area, 237,694 are owned by private parties while the state owns 79,717 ha and the counties 6,830 ha. The state woodlands are mainly found only on Sealand and in Jutland. The largest aggregate private woods are found on the islands while most of the smaller ones are in Jutland. The largest woods are owned by »fief« holders and entailed estate owners. The largest wood in private ownership is on the count's estate of Frijsenborg in Jutland which covers 7,200 ha.

According to the report for 1909 of the statistical bureau, the average annual wood yield for the whole country is 5.6 cubic meters per ha wood covered area.

Under the wood conservation act of 1805 most of the larger woods are conserved and since the founding of the heath society there are continually more conserved woods established especially in Jutland. The conserved woods must be kept properly fenced in and protected, and if any part of it is cut down it must be replanted. The law further ordains that any one who buys such woods must not cut any for sale during the first 10 years without the permission of the agricultural department and then according to the marking by it's foresters.

The agricultural department in Copenhagen is the highest authority in all cases regarding the woods.

The state woods are under the direct management of the agricultural department and there is a special director in charge of the woods which are divided into 24 districts managed by wood rangers assisted by game keepers.

The agricultural department has also charge of the state forest experiments conducted by a commission in which are representatives for both the state and the private wood industry. The reports of the commission, which is located in Copenhagen, are published annually and sold in the bookstores.

The state supervision of the checking of sandflights and of the woodplanting in the sand downs is in charge of a downs inspector, appointed by the agricultural department, with four assistants, three of whom also act as chief planters. The area of the downs plantations now aggregate cir. 26,174 ha. The plantations are chiefly made with pine trees and were commenced about 1800 but were pushed only since 1861 when chamberlain de Thygeson became downs inspector.

As early as 1788, the state commenced making experiments in planting the heaths. The first plantations were Stendalgaard by Viborg, Randböl by Vejle and Palsgaard by Nörre Snede. Experiments were first made with sowing wood firs but this failed. Later red pines were used and there are now fine woods in those places with trees up to 25 and 26 meter high. The state heath plantations now cover some 24,492 ha.

The Danish heath society was founded March 28th 1866, with the aim of promoting the fertilization of the heaths in Jutland, striving to do so by forming plantations in the heath, by irrigation and by meadow culture etc. These activities were later extended to cover the whole kingdom.

The society is managed by a council of 35 membres and an executive committee of three. The office of the society is at Viborg.

The plantations of 5.5 ha or more may be made conserved woods and thus secure the subsidy given to heath plantations amounting to one third of the total expenses. The society now controls 2073 plantations covering some 73,147 ha; on the islands there are now about 70 conserved woodplantations in all cir. 1269 ha, the others are in Jutland where the most and the largest are found in Ringköbing and Ribe districts which together aggregate a plantation area of cir. 36,407 ha. Of the whole plantation area about 54,610 ha are now planted — as a rule — with red pine and, where this will not thrive, with mountain firs. Lately however some wood firs and Sitka spruce are also used. The largest united plantation complex administered by the heath society is at Birkebæk 15 km south of Herning and comprises cir. 2758 ha.

The state and the largest private wood districts are managed by foresters. The higher forestry education is, since 1863, given at the Royal veterinary and agricultural highschool in Copenhagen. The training takes 6 years, 2 of which are spent in the wood districts.

The Training of the Underranger's (the lower forestry education) takes place under the supervision of »board of training« appointed by the agricultural department and the training takes 3 years chiefly in practical work. The smaller private districts are often managed by men with game keeper's education.

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Conversion Table.

1 Kilometer (km) = 0.132758 Danish mile = 0.621372 English mile.
1 Hectare (ha) = 1.812834 Danish »Tønde« land (Td.Ld).) = 2.471059 acres.
1 Hectoliter (hl) = 0.78798 Danish »Tønde« grain (Td) = 2.8377 bushels.
1 Kilogram (kg) = 2 Danish pounds (℔ or Pd.) = 2.204622 lbs.
1 Liter (l) = 0.264179 American Gallon.
1 Krone (Kr.) = 100 Øre = 26.8 cents = 13.2 d.
1 Danish mile = 4.2 English miles.
1 — Tønde Land (Td. Ld,) = 1.4 acre.
1 — — grain (Td.) = 1.391212 hl = 0.478176 qr.
1 Pot = 0.255229 American Gallon.
1 »Alen« = 2 »Fod« = 2.059424 English feet.

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